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OFFICE OF NAVAL ADVISOR
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Medical Section
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FOREWORD TO THE TRANSLATION

REPORT OF THE SECOND CONFERENCE OF THE MEDICAL CONSULTANTS TO THE GERM.

ARMED FORCES.

In this report of the Second Conference of the Medical Consultants to the German Armed Forces, held in the fall of 1942 while their war machine was still in its full vigor other than for one bad winter in Russia, we find them engaged largely with consideration of problems not commonly encountered in civilian practice. The necessity of indoctrination of their medical officers and troops in the treatment of these new problems is referred to frequently.

From the professional point of view it is interesting to note their attention to the problems of tuberculosis and psychiatric matters, and their probing into Hepatitis Epidemica and War Nephritis.

From the historical point of view this was the second meeting of the Scientific Senate following the centralization of the Medical Service which occurred as part of the general reorganization of the Armed Forces subsequent to the disasterous campaign in Russia in the winter of 1941. Anyone interested in the historical aspects of the Medical Service of the German Armed Forces is referred to the History Project of this section which will appear later.

23 March 1948.

HARRY J. ALVIS,
Commander, Medical Corps,
U. S. Navy.

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R E P O R T

OF THE

SECOND CONFERENCE OF SPECIAL MEDICAL CONSULTANTS

FROM 30th NOVEMBER TO 3rd DECEMBER 1942

AT THE MILITARY MEDICAL ACADEMY, BERLIN

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A N N E X

CONFERENCE ON PROBLEMS OF MOUNTAIN PHYSIOLOGY

4th TO 6th OCTOBER 1943

ST. JOHANN, TYROL.

* * *

Translation prepared by:

Office of Military Government for Germany (US)
Office of Naval Advisor
Medical Section.

The lectures could be printed only in an abbreviated form as short summaries. If the place of detailed publication is already fixed, this is given at the end of the respective article.

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PREFACE TO THE REPORT

The second conference on the problems concerning the war in the East took place from 30 November to 3 December 1942 in Berlin. This conference for the first time met under the auspices of the entire Armed Forces and brought together Chief Medical Officers, Consultant Surgeons and Specialists of all branches of the Armed Forces, SS-troops (Elite Guard) and all the affiliated organizations.

This second conference had the same purpose as the first conference, held in May 1942, namely to review critically all military regulations in the medico-scientific field. The prospect of the second winter of war offered new problems. As a matter of course, the experience gained during the past winter served as a basis for the discussions of questions which had become urgent. The presence of experts of all branches of the Armed Forces promised that the results of this conference would be particularly fruitful, especially in view of the fact that certain problems had been successfully attacked by different branches of the Armed Forces.

The consultant internists in collaboration with the Physiologico-Chemical-Institute of the Military Medical Academy brought about many interesting discoveries concerning the soldiers' diet, both in peace and war times with regard to scurvy. The results of this cooperation revealed that certain assumptions with regard to deficiency diseases, especially the so-called "hypovitaminoses" had to be revised in certain respects.

The world wide extension of this war and the fact that important tactical operations have to be carried out under extremely varying climatic conditions, make it necessary to include, more than ever before, geo-medical considerations in the scope of the discussions. Nowadays, diseases which are peculiar to tropical climates offer a problem to the field surgeon who must be familiar with their importance, diagnosis and treatment; the consultant surgeon, on the other hand, has to include these diseases in his research plans.

The importance of this second conference is immediately acknowledged by the fact that such a wide variety of problems has been considered. The conference, in a certain respect, gives a picture of the events of the war during 1942 as they occurred in the areas in three parts of the world.

The minutes of this meeting had to be condensed. They are herewith presented to the Chief Medical Officers as well as to all Consultants. In so far as the instructions compiled in connection with the different topics necessitate a modification of the current Medical Manual No. 209, this fact must be borne in mind in case of a reprint of the corresponding chapters. It is not intended that those revisions deemed necessary shall be published in label form to

be pasted in over the original text. The medical personnel
are supposed to adhere to these minutes, unless an extensive
alteration of the existing medical arrangements are re-
quired.

The Army Group Surgeons, Chief Surgeons and Consultants
are especially advised to study the results carefully and
to avail themselves of the practical applications. A limited
number of copies of this report is placed at the disposal
of the important hospitals.

/s/ Dr. HANDLOSER

S p e e c h

of the Chief of the Armed Forces Medical Service.

Gentlemen!

The demands due to the extension of this total war and
the ratio between the requirements and the availabilities in
regard to personnel and material necessitate the adoption of
drastic measures towards simplification and centralization
of authority. The military maxim "to advance upon an objec-
tive separately and to fight as one unit" must, with regard
to our present problems, be revised. The conditions which
now face us, necessitate a complete change of this tactic:
"we must now march and fight as one unit".

In accordance with this new concept, the post of Chief
of the Armed Forces Medical Service has been created out of
the former office of the Armed Forces Medical Service. Not
only personnel and equipment but also all problems of medico-
scientific training and research must be coordinated in a
general plan.

Therefore, the circle of the participants of the Second
Conference (East) is wider than that of the First Conference
in May 1942, which was properly speaking a conference of the
Army alone. Today representatives are present of the three
branches of the Armed Forces, the SS-Troops, the Police, the
Labor Service, and the Organization TODT.

Gentlemen, you will allow me to extend to you a word
of welcome and I wish to express the hope that our combined
efforts may show favorable results. A special welcome is
extended to Secretary of State, Chief of the National Health
Service, Dr. CONTI, in whose responsibility lies the guidance
of this project in the civilian sphere. I see in his presence
not only an expression of interest but also an expression of
concern towards the Armed Forces. I need not emphasize that
we share the feeling of responsibility towards the fighting
soldiers and give him the assurance that everything possible
is being done in the medical field at home to keep up the
highest level that can be attained under war conditions.

In consideration of the new participants in today's
conference it seems necessary to review the scope of former
medical conferences:

January 1940

Wound-treatment, wound–infection, blood-transfusion
under combat conditions, injuries by chemical weapons,
dysentery, neurosis, psychopathia and organic diseases,
evacuation of wounded soldiers;

October 1940

Gas-edema: prophylaxis and therapy;

December 1940

Immunizations: typhoid-fever, dysentery, combined
immunizations;

May 1942

First Conference "East"

The problems with which we have been confronted
in the East, namely the boundless depth of the Russian
territory, the condition of its inhabitants and the
thinly distributed railroads in Eastern Europe, the
ever present danger of an invasion of epidemics from
the Asiatic countries and in particular the Russian
winter, are reflected in the topics of the first con-
ference dealing with:

Technique of amputation; - brain injuries and their
treatment, coordination of neurology and surgery; -
chemotherapy of wound infections; - evacuation of the
wounded.

Typhus, Volhynia fever, recurrent fever, bacillary and
amebic dysentery, typhoid fever, diphtheria, tularemia,
war nephritis.

Effects of cold.

Reduction of the general resistance.

Treatment of psychogenic reactions.

Sulfonamide treatment of neurological diseases.

It is particular interesting to observe how the topics
of today's conference mirror the developments of the severe
war in the East.

As far as surgery is concerned, the conference will
deal in the first place with problems of abdominal surgery,
injuries of the lungs, maxillary injuries, injuries of the
joints, fractures of the thigh due to gunshots, surgical
treatment of the injuries caused by cold. The internists
are chiefly concerned with hepatitis epidemica and war
nephritis. As a matter of course, special attention is de-
voted to tuberculosis. Dermatologists and experts of foren-
sic medicine participate for the first time. Fortunately,
the presence of the dermatologists has not been called forth
by an increase of venereal diseases. Their cooperation has
been assured in connection with the problems of the effects
of cold. You will realize that also the experts of foren-
sic medicine have an important task to fulfil in the fourth
year of the war. Their activity is highly important for
the proper administration of justice and a closer cooperation
in line with the general objectives of the commanders of the
Army Groups will be consiered. The work of the hygienists
and specialists for tropical diseases will be concentrated

on wound diphtheria and malaria. Oberkriegsarzt (Lt.
Col., MC.) Professor KLIEWE will acquaint you with pre-
paratory measures of our enemies which have not been dis-
closed so far. The pharmacologists who did not participate
at the last conference have been invited again as it ap-
peared timely to recall the essential points of the treat-
ment of injuries caused by chemical weapons. Specialists
for tuberculosis also are among the new guests. They work
together in their pursuits with the pathologists and in-
ternists. Examinations carried through in this war have
thrown a light on the course of tuberculosis in colored
people, who had never before come in contact with this
disease. New findings concerning tuberculosis are relevant
in connection with the evaluation of disabilities incurred
in the service and are important enough to be included in
our considerations.

This war has called for extensive operations in
deserts and salt steppes which offer considerable problems
with regard to a regular supply of potable water. The
chemical analysis of water and devices for the chlorination
and purification of water have, therefore, become major
problems. The evaluation and examination of foodstuffs
from the chemical point of view deserve special attention
with regard to the critical supply situation, weather con-
ditions, long transport distances etc. The examination of
the nutritive value of the prepared meals, that is to say
the value of the actual intake, and a simple classification
of foodstuffs according to their caloric value is of special
importance.

The procedure of this conference will be much like the
last one and the different problems will be discussed ac-
cording to the present state of knowledge. Thereupon the
measures and amendments deemed necessary will be determined.
I would ask you to use your best endeavours to lay here the
broad and reliable foundation and scientific basis for all
military orders and directives in the medico-scientific
sphere; but doing so you will contribute an important share
to the combat efficiency of our valiant troops.

Another Russian winter with all its hardships and
perils lies ahead of us. We enter this winter with sub-
stantially better preparation than the last one. We have
taken ample advantage of all the experience gained and are
confident that the coming winter will find us well prepared
in every respect. Our soldiers are well equipped to defy
all the hazards of the season. Extensive preparations
were made to launch an efficient campaign against typhus.
Aside from swiftly operating central delousing stations,
we have established a great number of mobile units which
enable us to decentralize the combat against lice. We
succeeded in increasing the output of typhus vaccines of the
existing plants and new plants will be added which promise
a still greater supply.

The prophylactic measures with atabrin against malaria
proved satisfactory in every respect and the combat ef-
ficiency of the troops could be maintained even in areas
where malaria is most prevalent. Particularly successful
work has been done in the field of general hygienic measures
and terrain sanitation carried through during the summer
in the respective areas. These measures have been pre-
ceeded by thorough investigations not only of the topo-
graphic but also of the ethnographic conditions. The dis-
covery of the spleen index in children in these areas is
a result of these investigations. The laboratory train of
the High-Command of the Armed Forces as well as the motorized
laboratory units of the Army and the malaria instructors
have done an excellent job in cooperation with the consultant
internists; their work will prove beneficial for the popu-
lation of these areas for many years to come.

The combat of epidemics has been entirely reorganized
in the different theaters of war. Medico-topographic in-
vestigations furnished the necessary basis. The atlas of
epidemiology which has now been published covers all areas
which might possibly be of interest in this war and it
will be placed at the disposal of all interested organizations
as a source of fundamental information. Although this atlas
for obvious reasons will not be on sale in the bookstores
it will, however, be made available to the medical schools
as a means of preparations of the students for their future
military assignment.

A soldier does not look back on past events and neither
does the surgeon, who is a soldier of the Armed Forces. In
this circle, however, an appreciative consideration of the
work done in the past three years of war will not be out
of place. The medical chores and military necessities have
to follow principles of their own and in the person of the
medical officer lies the synthesis to make these principles
compatible with one another. Although all the parties con-
cerned quickly agree on the general route to follow, the
practical application often conflicts with the actual con-
ditions. The more often we find ourselves confronted with
bottlenecks due to space and time, the more it will be nec-
essary to resort to compromises which not infrequently con-
stitute the only solution of a problem under given circum-
stances.

In this connection I wish to say a few words on the
technicality of the reports of the consultant surgeons.
They should be brief and concise and include definite
proposals. Special consideration must be paid to the
actual wartime conditions to ensure that the suggestions
are practical. It will, therefore, be necessary to con-
tact all Chief Medical Officers ahead of time who in some
way are involved in a certain problem. If military commands
are involved the responsible officers have to be informed
in due time. The Chief Medical Officers should assume
the liaison to military commands.

Hand in hand with your advisory function goes the practical work whenever the opportunity arises. The long duration of the war makes your cooperation in this respect more necessary than ever before. Many or our medical students have had no connection with their alma mater for more than three years. Thousands of young physicians have been inducted as field surgeons and many of them stay on that post for years. It is, therefore, an important task of the consultant surgeons to acquaint their young colleagues with the progress in the medical field and above all to train their diagnostic capabilities. Special plans have been conceived for a perpetual rotation of the front line surgeons and surgeons at home, but the adverse conditions of war make a systematic and quick rotation impossible. We must, therefore, aim at a decentralization of medical training in order to avoid serious shortcomings.

At our first conference "East" in May we have paid tribute to two of our comrades who had lost their lives for our country: Oberstabsarzt (Major, MC.) Prof. SEELIGER and Oberstabsarzt (Major, MC.) Prof. SOMMER.

Since that time two more consultant surgeons have sacrificed their lives for their country. Oberkriegsarzt (Major, MC.) Prof. SUEPFLE, consultant hygienist of the 6th Army died on 29 September 1942; Oberstabsarzt (Major, MC.) BASTEN, consultant hygienist of the 9th Army died in the field as a victim of typhus on 20 November 1942. Oberfeldarzt (Lt. Col., MC.) Prof. KIRCHNER, Consultant Surgeon of Wehrkreis XII, died on 30 August 1942 at Heidelberg as a victim of an insidious disease.

Three highly merititorious men have passed away who served the medical cause in peace and wartime. They live in our memory together with the great number of surgeons and assistant surgeons who lost their lives in Soviet Russia and Africa and who set an example of loyalty and high sense of duty.

You have risen in tribute to these soldiers. I thank you.

And now I finally have at heart to thank you for your faithful cooperation in the past three years of war. This work bears its reward in itself and will stand as a magnificent monument of the achievements of the German physicians in this war which becomes visible in the lives saved and in restored health and working capacity. I wish your work all the success. All knowledge, research and advice is crowned by action and it is the objective of our conference today to pave the way for action to the benefit of our valiant German soldiers.

I.

<u>P R A C T I C A L   P R O B L E M S</u>

<u>O F   W A R - S U R G E R Y</u>

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

Amputations in case of injuries due to cold
(See Section II, Article 3)

1. Introductory report.

Directives on the treatment of cachexia due to sepsis and protein loss.

Oberstarzt (Colonel, MC.) Prof. WACHSMUTH

The demand for special hospitals for patients, who for personal or material reasons require certain conditions, seems to be justified. This refers first of all to severe injuries of the extremities, jaw and skull, due to gunshots. In addition to especially qualified personnel, these special hospitals would have to offer all the technical facilities necessary for the efficient treatment of the respective diseases. Whether the establishment of these special hospitals is practically possible, depends beside the difficulties of organization and transportation, general medical economy, etc., in the first place upon the number of patients concerned. On the basis of the statistics at hand concerning patients under treatment in the different military districts, the conclusion has been reached that the establishment of special hospitals or special wards for patients with injuries of the jaw, skull and eyes, lies within the realm of possibility. It would, however, be difficult to create a similar organization at home for all severe injuries of the extremities which would have to include, in addition to fractures of the femur and injuries of knee joints due to gunshots, at least the severe injuries of the leg and of the upper extremities. Even a considerable increase in the number of the already existing special hospitals would not be sufficient to meet the actual requirements. With the view of improving the results of the treatment of the patients now being admitted to small hospitals and who suffer from severe injuries of the extremities due to gunshots, only one solution seems possible, namely, the establishment of 1 or 2 hospitals for instructional purposes in every military district. In these hospitals, information and practical advice ought to be given in rotation to all surgeons at home entrusted with the care of these severe injuries, in order to establish uniform treatment procedures. This endeavour, which can be directed centrally is, however, not intended to create a stereotyped pattern of treatment. We rather aim at disseminating the well established principles, many of which are frequently enough disregarded in many places. These courses ought to include the following topics:

Theoretical and practical instruction:

I. General surgery:

1. Treatment of combat injuries and their complications;

2. Treatment of infections in general;

3. Secondary hemorrhages;

4. Blood transfusion, blood substitutes, continuous intravenous drip.

   II. Surgery of the extremities.

1. Indication and technique of fixation by plaster of Paris bandages, free extension, combination of wire and plaster;

2. Technique and indication for the perforated rod apparatus;

3. Indication and technique of sequestrotomy;

4. Indication and technique of the reduction of fractures (by extension, plaster of Paris casts, closed and open reductions, etc.);

5. Indication and technique of follow up treatment of injuries of the joints (conservative and active surgical intervention);

6. Indication and technique of amputation and correction of stump;

7. Indication and technique of treatment of pseudarthrosis;

8. Indication and technique of removal of foreign bodies;

9. Indication and technique of local and general treatment by movement exercises in the sick-bed and during the follow up treatment.

One outstanding problem, namely the treatment of conditions which we might describe best as septic cachexia and cachexia due to loss of protein, is still of much concern to us. We observe these conditions in wounded patients, generally of youthful age, with severe bleeding or suppurating injuries, who fade away in spite of all treatments. Numerous cases of this kind have been observed and studied in all details in the special hospitals for surgery and by the special group of surgeons. A continuing observation of the protein content (DUESBERG and SCHROEDER) has been instituted on these patients.

A report on the loss of plasma and protein during one month in a wounded patient and examinations at the special hospital for surgery concerning the average loss of protein and possibilities of replacement reveal that with an average daily loss of 12.6 grams of protein, it is only possible to maintain the protein balance by a daily serum infusion of 320 cc. or by a daily blood transfusion of 107 cc.

Causes, clinical picture and treatment of cachexia due to sepsis and protein loss.

I. Causes:

High grade physical exhaustion, lack of food, persistent increase of metabolism (fever), protracted loss of protein of the body through hemorrhage and suppuration produce a general decrease of resistance and a consumption of the protein reserves of the body. A hypoproteinemia develops. Progressive toxic damages to vessels, heart, liver and kidneys render the initial conditions still worse.

II. The clinical picture:

The clinical picture is characterized by a serious emaciation, loss of appetite, profuse serous and purulent secretion from the wounds, diarrhea and edemas in the involved parts of the body. A conspicuous reduction of hemoglobin and leucocytes can be observed in the blood picture. The content of plasma and albumin is decreasing. The extravasation of blood and tissue is to be explained by a shifting of the osmotic relation of blood and tissue because of the hypoproteinemia. Disturbances of the functions of the heart, liver and kidneys are the clinical symptoms of a developing serous inflammation of one of these organs.

III. Treatment:

The treatment includes:

1. The removal of the cause of the protein loss by surgical measures such as incision, early amputation or disarticulation;

2. parenteral and enteral supply of protein by blood transfusion, serum infusion, by adequate food rich in protein (milk powder, eggs, meat); use of duodenal tube feeding in case of complete loss of appetite. The supply of liquid alone is of no avail;

3. administration of drugs, such as adrenalin derivatives, iron preparations, adrenol cortical hormones.

Discussion:

In order to avoid unnecessary loss of protein, GOETZE recommends the earliest possible closing of all important granulations by means of repeated graftings according to the method of BRAUN, in addition to blood and serum infusions.

2. Special points on abdominal surgery and

Directives on the treatment of gunshot wounds of the abdomen

Oberstarzt (Colonel, MC.) Prof. GOHRBRANDT

Every patient with an injury of the abdomen caused by a projectile or with an injury of the abdominal organs should be operated as soon as the circumstances permit and as long as the operation promises success.

A limitation of time for the operation (10 to 12 hours) does not actually exist. The name of the medical unit is not decisive with regard to the place where the operation should be performed. Advantage should be taken of the first opportunity for operation which offers the possibility for a subsequent period of quiet.

The operation has to be performed in the most simple manner. Large resections, especially resection of the large intestine, should be avoided in favor of a marsupialization.

The surgical treatment stands in the foreground. Additional use of sulfonamides is recommended. For local application in case of partial peritonitis Prontalbin-Marfanil powder (up to 30 grams) is strewn over the infected area; in case of a diffuse peritonitis dissolved sulfonamides will be poured into the abdominal cavity. In addition to this local Prontalbin treatment the customary treatment with sulfonamides in case of peritonitis will be instituted.

Furthermore it is advised to use a peritonitis serum derived from several strains. An immediate effect is only produced by intravenous inoculation. No anaphylactic shock is to be feared if the serum is given slowly during a deep narcosis or otherwise by continuous intravenous drip.

It is suggested that the poisonous substances due to a disintegration of body protein be referred to as "Noxine". For their elimination parathyroid preparations are recommended.

Discussion:

In patients with a reduced power of resistance, GOETZE suggests sewing up the linea alba with a continuous buried suture with 0.3 mm. strong, extra soft and non-oxidizing wire of Krupp's V2A steel. In this manner an evisceration is avoided. For the closing of fistulas of the rectum draining to the back, GOETZE suggests mobilizing the rectum on both sides upwards and downwards by approach from the hollow of the sacrum and to cover the resulting hole with a large pedunculated flap of skin.

KRUEGER: Suggests the use of sulfonamides for ab-
dominal injuries; he believes that his good results (55
per cent of complete recoveries in nearly 1000 cases of
abdominal injuries caused by gunshots, which percentage
includes the fatalities occurring in base hospitals)
could be obtained thanks to the use of sulfonamides.

W. SCHULZE: Declared himself decidedly in favor
of sulfonamides.

SMIDT: Rejects the intraperitoneal use of sulfona-
mides. As many as 7 surgeons obtained 50 percent recover-
ies, although under peace time or similar conditions, with-
out having recourse to sulfonamides.

3. Treatment of fresh gunshot wounds of the lungs.

Stabsarzt (Captain, MC.) Prof. KRAUSS

According to the experience gained by this consultant
in 336 cases at the Eastern Front, the treatment of newly
inflicted lung injuries caused by projectiles must fulfil
three conditions:

1. surgical treatment of the wound;

2. the elimination of pathological pressure con-
ditions;

3. prompt restoration of normal pressure conditions
within the thoracic cavity.

The first condition is based on the general principles
of war-surgery; chest wounds, however, for vital reasons
call for the closing of the open pneumothorax by suture.
The suture of the musculature should be used, if possible
in two layers; the suture of the skin as the third layer
may be delayed up to 12 hours and under particularly favor-
able conditions up to 24 hours. Injuries caused by shell
and mine splinters of bullet size frequently lead to severe
phlegmons within the muscular parts of the pectoralis and
shoulder area and in this case, the trimming and fixation
of the wound according to the conservative procedures is
to be preferred. The bleeding is to be stopped by approxi-
mation sutures which are to be placed with round needles.
Particular care must be given to the intercostal and internal
mammary arteries. The removal of a fragment of a missile
from the lungs will be done only it it can be done easily
and if the lungs have to be exposed anyhow. The second point,
namely the elimination of pathological pressure conditions,
includes the closing of the open pneumothorax in order to
stop the shifting of the mediastinum. If the closure cannot
be effected by suture even by shifting of the soft parts,
tamponade of the pleural cavity is the method of choice.

Artificial respiration is not an absolute necessity in
this procedure, it contributes, however, to the allevia-
tion of the patient's distress. Pressure and valvular
pneumothorax are eliminated in the acute stage by aspiration.
The closed drainage of the valvular cannula is superior for
permanent relief. In case of a displacement by liquid a
slowly applied aspiration in the acute stage aiming at
establishing the equilibrium of the mediastinum, e.g. the
pressure value of $\pm$ 0, must be considered as the method
of choice. A mediastinal torsion in case of a partial
collapse of the lungs will be removed immediately by a
therapeutic pneumothorax. Dorsal mediastinotomy is in-
dicated in case of a mediastinal emphysema. The third
step is the restoration of normal intrathoracic pressure
conditions which help the body to remove blood and exudate
along with the creation of conditions favorable to the
respiration and the circulation as well as to the biologic
function of the pleura. At the same time the lungs are
expanded and this expansion is particularly important for
the healing of any pleural disease, as the stress is taken
off the suture of the open pneumothorax and a secondary
extravasation as well as a thick callous coat of the lungs
and the resulting residual cavities are avoided. This is
synonymous with a shorter treatment and protection against
infections and their sequelae: amyloidosis and cachexia.
Closed drainage is the method of choice to obtain these
conditions and the intrathoracic physiology responds
favorably to all types of punctures, from the single
puncture to the permanent puncture performed as a closed
drainage according to BUELAU. The practical conclusion
which imposes itself is the early aspiration of the hemo-
thorax under normal pressure conditions after 3 to 5 days.
The duration of each aspiration depends primarily on the
intensity of pain and cough irritation experienced by the
patient. As a rule 3 to 4 aspirations within 2 to 3 weeks
will be sufficient. In case of a continuous outpouring
of exudate following a sterile hemothorax the application
of closed drainage should not be delayed for more than 3
weeks. The infected hemothorax ought to be treated by
closed drainage not later than 8 to 12 days after the
injury. In case of a later application, the lungs fail
to expand, unless auxiliary means are employed. A second-
ary open pneumothorax calls for a closed drainage after an
approximation of the wound by bandages or suture. As a
logical conclusion, the prophylactic application of closed
drainage is to be advised in all those cases of larger in-
juries of the thorax in which the closure of the open
pneumothorax by suture could only be performed by the use
of pressure or by the shifting of the soft parts. In case
of an infected hemothorax a delayed application of closed
drainage may prove hazardous, since the growth of the
resorptive surface and quantity, as well as the formation
of the pleural callosity, constitute additional hazardous
factors. The particular advantage of closed drainage con-
sists in the concomitant removal of the exudate and ex-
pansion of the lungs which promises a satisfactory result.

The expansion of the lungs is secured only in case of an early use of closed drainage. The intercostal method for the initiation of closed drainage is always to be performed early. The leakage around the tube which begins around the 5th and 7th days, usually stops after 6 to 8 more days. In case of an early use, the expansion of the lungs usually requires 3 to 5 days. Empyemas due to injuries caused by projectiles are poor in fibrin. The occasional blockage of the drainage may be eliminated by rinsing with a boric solution. A renewal of the suction power of the negative pressure system is to be performed twice daily. The application of closed drainage under front line conditions is possible; it represents no obstacle to an evacuation.

Discussion:

KRUEGER: Also suggests the use of sulfonamides in case of fresh lung injuries due to gunshot. In about 1000 cases of injuries of the lungs caused by projectiles, the rate of mortality, including all cases which turned out fatal later on in hospitals at home, amounted to 12.6 per cent.

W. SCHULZE: Proposes the use of silk thread for sutures of the open pneumothorax and warns expressly against the use of catgut. Good results with regard to the pressure conditions of the suture of open pneumothorax have been observed by the application of subperiosteal, pericostal loops of wire around the adjacent ribs.

KRAUSS: Has not observed an essential influence of sulfonamides on lung injuries caused by projectiles.

Directives for the treatment of newly inflicted injuries of the lungs due to gunshots.

The treatment must fulfil three conditions:

1. the surgical treatment of the wound;

2. the elimination and removal of pathologic pressure conditions;

3. the restoration of normal pressure conditions within the thoracic cavity.

1. Wounds of bullet size, if impermeable to air, will be covered with a sterile dressing which will be held in place by airtight, adhesive bandage material overlapping by 3 to 5 cm. on all sides. All other injuries are to be taken care of according to the general principles of war surgery concerning soft parts and bone tissue. The same applies to bullet sized wounds of the pectoral muscle and shoulder area caused by bomb and shell splinters. A possible developing pneumothorax will be closed by the application of a suture of two layers. The additional skin suture may

as a safety measure be applied up to 12 hours and under
especially favorable conditions even up to 24 hours later.
An early removal of the skin suture at the onset of in-
flammation is necessary due to the possibility of phlegmons.
The use of adhesive tape to ease the stress on the suture
is indicated.

Exposure of <u>lung wounds</u> will be undertaken only if
the clinical picture of continual hemorrhage suggests a
possible intra-pleural hemorrhage (rapidly increasing
dullness). Bleeding lung wounds are to be approximated by
deep stitches with round needles and catgut. Due regard
must be given to the intercostal and internal mammary
arteries. In case of a hemorrhage the suture is to be
performed with silk and if necessary with resection of
ribs.

<u>A foreign body</u> (<u>missile</u>) in the lungs will be removed
only if this can be easily done and if the lungs are ex-
posed anyhow for another purpose.

2.   Elimination of pathologic pressure conditions.

a.   <u>Mediastinal flutter</u> due to open pneumothorax
is eliminated by the use of sutures in 2 to 3
layers (See # 1).

In case of extensive disruptions with partial
loss of two and more ribs, plastic shifting of the
soft parts has to be undertaken in order to com-
plete a closure with a minimum of tension. If
the disruptions are so extensive that an approxima-
tion suture is impossible, a tamponade of the
pleura with the Mikulicz bag or the air-tight
sewing in of the lungs into the fenestra of the
thorax has to be performed.

b.   <u>Positive pressure due to air</u> in cases of
pressure and valvular pneumothorax will be elimi-
nated in the <u>acute stage</u> through aspiration in the
2nd or 3rd intercostal space about two fingers
width from the sternum. For <u>permanent relief</u>,
<u>BUELAU's drainage</u> is superior to a valvular
cannula.

c.   <u>Positive pressure due to blood or exudate</u>
is eliminated by aspiration to establish the
equilibrium of the mediastanum, i.e. up to the
pressure value of ± 0. Caution and slow per-
formance of drainage is advised until liquid
just drips from the cannula or just forms a drop
in the needle lumen when the syringe is removed.

3.   The restoration of normal intra-thoracic pressure
conditions will be accomplished as follows:

a.   In all cases of injuries of the thorax in which the closing of the open pneumothorax was possible only under tension or through shifting of soft parts, by the prophylactic application of BUELAU's drainage in the same operation.

b.   In cases of hemothorax without pressure on the mediastinum by the use of closed aspiration, if possible by use of the two-way cock, on the 3rd to the 5th day. The aspiration must be interrupted as soon as the patient feels pain or cough irritation. As a principle no aspiration should be continued to the point of a complete drainage. The aspiration has to be repeated after a couple of days; in most cases 3 to 4 aspirations within 3 weeks are sufficient.

In case of an uninfected hemothorax, filling itself very quickly with exudate and in which the exudative process does not come to a standstill by the end of the 3rd week, closed drainage, according to BUELAU, has to be undertaken.

c.   In case of an infected hemothorax, the early establishment of closed drainage is indicated at the latest 8 to 10 days after the injury.

d.   In case of a secondary open pneumothorax, BUELAU's closed drainage and approximation of the wound either by airtight adhesive tape or by a secondary suture performed at the same time, will serve the purpose.

Points of general interest about BUELAU's drainage.

The patient assumes a sitting position. Local anesthesia will be sufficient. The drainage will be performed with the standard equipment, preferably at the deepest point between the median and the posterior axillary line and with a small intercostal incision of 3 to 4 centimeters length (see directives). An open drainage will not be performed; a rib resection is not necessary. After clamping the tube of BUELAU's apparatus, the negative pressure system should be rinsed and freshly filled twice daily if possible, in order to restore the suction power. The leakage around the tube, occurring between the 5th and 7th day, usually stops in about 6 to 8 more days if the tube is allowed to remain in position. A stopped up drain, which is a rare occurrence in the early operation, will be taken care of by rinsing with a boric solution. If the patient is otherwise in a transportable condition, the BUELAU drainage, after a period of 3 weeks will not represent any obstacle to evacuation.

General remarks on the treatment.

For general relief of pain and the normalization of the respiration in order to give rest to the lungs and chest, the administration of a 0.01 dose of morphine or a morphine derivative every 8 hours during the first 3 to 4 days is recommended. As long as a drainage has not been applied, the patient is at liberty to assume a convenient position; after the drainage is performed a prostate position has to be avoided; elevation of the upper part of the body is necessary. In case of a loss of blood not too large amounts (up to 500 cubic centimeters) of blood, serum and saline solutions will be given.

Evacuation.

If possible, chest injured patients, after proper care has been taken of the chest-wound, and after closing an open pneumothorax and eliminating the abnormal pressure conditions, ought to be brought as fast and carefully as possible, best by air, to that medical unit which is able to provide the final surgical and follow up treatment for at least 3 to 4 weeks. The general condition of the patient, as a matter of course, must be such that the evacuation will not present special hazards.

4. The late treatment of gunshot wounds of the lungs.

Directives for the treatment of gunshot injuries of the lungs in hospitals at home.

Oberfeldarzt (Lt. Col., MC.) SCHINDLER

The fate of severely injured patients with severe gunshot wounds of the lungs depends to a great extent on the care given in dressing stations at the front. The patients should not be transferred too early to hospitals in the homeland. Also patients with hemothorax ought not to be evacuated for at least 3 weeks and then only to hospitals in which they may stay until completely cured.

I. Missiles lodging in the body.

The only indication for removal of missiles from the lungs is bleeding or suppuration. Missiles should only be removed after a most exact localization.

II. Lung abscesses due to missiles lodging in the body.

Abscesses due to the missiles lodging in the lungs ought to be operated early if the missile is the cause of the suppuration. Ordinary lung abscesses should be treated by conservative procedures no longer than 8 weeks (single doses of Salvarsan starting with 0.15 up to 0.3 grams, entire amount not more than 3 grams and diathermy).

Abscesses due to gangrene of the lungs ought to be opened at an early opportunity, particularly if located close to the pleura.

III. Empyema.

1. Late exudation with or without blood after gunshot injuries of the lungs, when observed in hospitals at home, are to be examined carefully and be kept under observation; early aspiration, especially in case of an increase of temperature, is necessary. If the purpose is not achieved after a maximum of 2 weeks, BUELAU's drainage will be employed.(see directives).

2. BUELAU's drainage *) is to be applied at the lowest point of the empyema as determined by percussion. At the right time expansion exercises with overpressure, inflating air cushions etc. have to be instituted. The continuous careful supervision and the later X-ray examinations as well as daily rinsings and fillings of the drainage tube system, in order to renew the suction power, are of primary importance. If in spite of satisfactory drainage no expansion occurs, the freezing (Vereisung) of the phrenic nerve is to be undertaken in order to put the diaphragm at rest. The suction apparatus should not be removed before the third or fourth week. After its removal, the insertion of a rubber tube which gradually and methodically is shortened and reduced in diameter, has to take place. If, owing to especially close position of the ribs, BUELAU's drainage cannot be applied with safety or when congealed exudate obstructs drainage, which rarely happens in cases of empyema due to gunshot injury, the airtight insertion of a thick rubber tube to be followed by suction treatment is necessary.

Only in very rare cases of extreme septic conditions is a wide cleavage and insertion of a Mikulicz bag indicated.

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*) Mistakes in the application of BUELAU's drainage:

1. The inner end of the BUELAU's tube lies above the surface of the liquid, pus cannot drain off. Correction: fenestrated tubes and frequent observation.

2. If BUELAU's drainage lies too far posteriorly, the tube is clamped. Lateral application, under no circumstances behind the posterior axillary line.

3. When BUELAU's drainage is placed in too low an intercostal space, the pus is drained off, the diaphragm moves up, sticks to the wall of the chest, and the pus stays above it.

4. BUELAU's drainage is placed correctly in an encapsulated cavity and another coexistent empyema is overlooked.

5. BUELAU's drainage is removed too early.

IV. Residual cavities.

1.   Residual cavities will be approached only after
at least three months. If a residual cavity does not
exist for longer than 4 to 5 months, the attempt of a
treatment with a water-jet vacuum pump should be made.
However, the suction power may be used only to the ex-
tent tolerated by the patient without pain and dyspnoea.

2.   Surgical treatment of residual cavities.

a.   Total residual cavities should be treated
first by extra-pleural, paravertebral plastic
operations according to SAUERBRUCH's technique.
By this method it is possible to make the cupola
space as well as the space in the paravertebral
angle disappear which offer special difficulties
to a plastic approach.

b.   Cavities which still persist will be treated
best by HELLER's lattice-plastic technique in
which case it must be considered that pieces of
ribs toward the spinal column as well as toward
the sternum have to be dissected 3 to 4 centi-
meters beyond the margin of the hollow space.
Also in an upper and lower direction 1 to 2 more
ribs have to be taken out in order to accomplish
a better adaptation of the costal and pulmonary
callosities.

3.   Persisting bronchial fistulas without residual
cavities and "honey-comb" lungs are to be treated according
to LEBSCHE's or LETZIN's method.

4.   Prior to the performance of any plastics, a
careful examination and preparatory treatment is imperative.
An improvement of the blood picture (transfusion), of the
functions of kidneys and heart has to be striven for in every
case, before an operation can be performed. In case of a
reduced general physical condition the operation ought to
be executed in several stages. If at all possible, operations
should be performed under local anesthesia.

In the event of serious disturbances in the after-
treatment according to BUELAU, after removal of foreign
bodies, abscesses of the lungs in case of remaining cavities,
bronchial fistulas and "honey-comb" lungs, operations are
to be undertaken only in hospitals (at home) which have
been designated by the consultant surgeons.

It is necessary to institute early active exercises
of the corresponding shoulder joint. If there exists a
suspicion of a combined injury of lung and diaphragm, the
possibility of a diaphragmatic hernia has to be kept in
mind.

5. Primary treatment of gunshot wounds of the jaw.

Directives.

Oberstabsarzt (Major, MC.) Prof. WUSTROW

Unnecessary sacrifices of facial tissue have more serious consequences in the future life of an injured patient than sacrifices of tissue on any other part of the body.

Smashed soft parts of the face should be sewed up finally only after splinting the fracture or destroyed bones beneath them.

If fractured bones have to be treated with emergency splints, the respective damaged soft parts will likewise be joined by emergency sutures only.

In cases of urgent necessity, emergency splints, once in a while also permanent splints, should be employed even at the main dressing stations.

For that reason, specially trained dentists should supervise the treatment of wounds of the jaw and decide immediately whether and which kind of splint (emergency or permanent splint) has to be used at the main dressing stations. This decides at the same time whether the soft parts are to receive a final or an emergency suture.

Smashed soft parts in jaw injuries due to gunshot are sewed best with wire (e.g. aluminum bronze wire 0.1 to 0.5 millimeters thick). The use of a suture over buttons is advisable in case tensions in the adjacent wound area prevail. Burrowed areas sometimes extending into the vicinity and lobulated skin shreds facilitate the closing of the wound. In such cases, the most careful and efficient drainage is of paramount necessity.

If proper drainage (at least at the deepest spot) is provided, facial wounds will heal primarily on the application of a late suture even ten and more days after the injury. Such a suture must be preceded by a freshing of the wound. These sutures will be called "late sutures".

A primary suture, even though only in the form of a late suture, is for that reason advised not only for injuries of thorax, joints and brain, but it represents also the proper procedure in cases of injuries of the face.

6. The late treatment of gunshot wounds of the jaw.

Directives.

Stabsarzt (Captain, MC.) Prof. HAMMER

The late treatment is intended to remove the damage inflicted upon the soft parts and the bone structure by the injury and the natural healing process. With regard to the soft parts, we distinguish two kinds of damage. The first kind includes injuries not involving a loss of tissue; the parts have only shifted and healed in the wrong position. In these cases scar plasty is required to correct the disfigurations. In the second kind, a larger loss of tissue is involved in addition to the shifting of soft parts. The affected areas will be restored to proper shape by defect plasty. The necessary replacement of bone defects of the upper jaw differs from those of the lower jaw. Upper jaw defects can only be taken care of by maxillofacial prosthesis which has to be performed early before disfiguring contraction of soft parts has taken place. Lower jaw defects have to be corrected by grafts. If, in order to perform plastics on the lower jaw, an opening of the cavity of the mouth cannot be avoided, transplantation of bone structures has to be undertaken. In particular, the following directives are to be observed:

1. A proper primary treatment of injuries facilitates and simplifies the later treatment.

2. In case of a late treatment of injuries which still are in an infected granulating stage, active measures are not suitable. The natural healing power is always to be given a chance. Special vigilance for possible complications is necessary. The position of fracture stumps is to be secured by prosthetic measures.

3. With regard to the late treatment of injured soft parts, a distinction must be made between scar plasty and defect plasty.

4. In the application of scar plasty, the scar tissue has to be removed radically, the edges of the shifted wounds made flexible, duly separated and then joined layer by layer in the right order.

5. The defect plasty has to be executed according to a well organized plan. The edges of the scars often afford valuable material for the inner layers. Grafts of hairless skin are always to be used for the inner lining. Lining of a simple flap by freely transplanted epidermis is unsuitable. Flaps from the immediate vicinity or from farther off are to serve as covers; flaps from the scalp are to be used only for replacement of hirsute face skin especially in case of symmetrical loss of tissue. The rolled flap, produced in varous steps is of inestimable value.

6. In every case of defect plasty, the necessary support to flaps will be provided by prosthetic means.

7. If possible, the lip coloring will be obtained from the patient's own resources. Recourse will be made to the upper lip for this purpose.

8. Shifted fractures will be adjusted by orthopedic measures as far as they are still movable.

9. Dislocated, healed jaw fractures have to undergo an osteotomy and appropriate correction. Distinction has to be made between fractures of parts with and without teeth. In fractures of a dental arch, the osteotomy has to be performed at the original site of the fracture. In case of fractures outside of the dental arch, osteotomy has to be undertaken at the ascending bone between the incisura and the mandibular foramen for the lower jaw and in Guerin's line with approach from the fossa canina for fractures of the upper jaw. In the latter case, the nasal septum has to be severed by approach from a small median incision.

10. Bone defects of the upper jaw are subject to _early_ prosthetic correction.

11. Bone defects of the lower jaw are subject to re-storation by grafts. The following principles apply to these cases:

    a. Excision of all scar tissue; provision of a suitable base.

    b. The simple insertion by superposition. No complicated measures; no dove-tailing of stumps for the purpose of insertion. No wire sutures. The position of the fragments is to be secured by dental implements.

    c. Sufficient freshening of stumps, stimulation of neoformation of bone through chiseling. Abundant covering of defect stumps.

    d. Fixation of the graft by layer sutures. If suture is necessary to keep joined bones in place, catgut is to be employed for suture.

12. A fixed (locked) jaw has to be worked against right from the start. Early employment of spreading devices is advised.

13. In case of a persistent locking of jaws on account of a formation of scars, an osteotomy has to be per-formed at the muscular appendix by an incision at the lower edge of the yoke bone.

14. If an ankylosis of a maxillary joint is the cause, the new formation of a joint by surgical measures is indicated.

15. For the surgical pseudarthrosis the retro-auricular approach, according to AXHAUSEN, is the most suitable procedure.

7. Primary treatment of gunshot wounds of the thigh.

Directives.

Oberstarzt (Colonel, MC.) Prof. WACHSMUTH

During the last two years, the staff of the special hospital for surgery of the High Command of the Army has had the rare opportunity to treat a great many cases of serious fractures of the thigh, due to gunshot injuries, from the very beginning to the actual discharge from the hospital. Again, observations have been especially impressive and confirmed that the hazardous period of fractures of the thigh due to gunshots is not limited to the first weeksafter the injury but that complications may occur many months later which may result in late amputations, disarticulations or may even cost the life of the patient. To a large extent, the occurrence of these late complications can be prevented by a proper primary treatment of thigh fractures due to gunshots. The primary treatment has to be performed according to the following directives:

The most important points of the primary treatment of thigh fractures due to gunshot injuries are the <u>fixation</u> for the duration of the transport, the <u>surgical treatment</u> itself and a <u>suitable immobilization</u>.

A. <u>The fixation</u>. The emergency fixation prior to the surgical treatment must fit the purpose i.e. it must include not only the adjacent joints, and most important of all the pelvis. This will be accomplished by use of a splint which must extend up to the thorax. Field-transport splints (New Model).

For the fixation after the surgical treatment, the appliance of the large plaster bandage, reaching down to the knee-joint on the healthy side is generally indicated. No makeshift bandages ought to be employed after the surgical treatment.

B. <u>The surgical treatment</u> aims at an approximate reduction of the fractures on the extension table, with a wide prophylactic separation in order to make possible a drainage of blood and pus from the septum intermuscular fibularis (to avoid late dependent abscesses). The prophylactic drainage is to be performed in all cases of bone destruction including injuries due to shell splinters of bullet size. Careful drainage of the wound is necessary.

C.   The most suitable immobilization must follow the surgical treatment. It is accomplished when the reduction of the fracture is secured in a recumbent position with a large pelvis plaster of Paris cast and held in place with the aid of the wire suspension apparatus. The free extension and bandaging by means of BRAUN's splint is, on account of difficulties encountered in taking care of the wound, the impossibility of evacuation and the increased danger of later complications due to dependent abscesses (under some circumstances subsequent suppurations of the hip joint) in general is not the method of choice for dressing stations at the front lines.

In the large, padded and fenestrated pelvic plaster of Paris cast and wire suspension device, the patient is transportable, freed of pains as much as possible and he is the least endangered by infections; the reduced fracture and the drained wound are in the most restful position.

8.   Later treatment and reparative surgery in gunshot
          wounds of the thigh.

Oberstabsarzt (Major, MC.) Prof. BOEHLER

Patients with fractures of the thigh due to gunshots ought to be sent, if they are transportable at all, as soon as possible to hospitals in which a proper treatment can be provided (Extension apparatus, wire, tension hooks and particularly portable X-ray equipment are an absolute necessity).

The aim of the treatment consists in:

1.   combatting chronic infections,

2.   the restoration of function.

The best means for combatting infections is the thorough exposure of all foci of inflammation and a continuous efficient drainage at the deepest spots. In addition hereto, the fractured leg, after a proper reduction of the fractured parts, must be kept uninterruptedly at rest.

Exposure of foci of suppurations. The suppurations proceed in pathways predetermined by anatomy, especially in insertions of the extensor and adductor muscles. For that reason, in all cases of suppurating fractures due to gunshot injuries in which the foci of suppurations have not been exposed yet, incisions must be made at the deepest places of the extensors and adductors in addition to the exposure of all other foci of infection. Large wounds in the area of the flexor do not provide a sufficient drain. Bone splinters will not be removed unless they are free in the wound because otherwise there develops the hazard of a defect-pseudarthrosis.

Reduction and fixation. For these purposes, as a rule, the extension splint shall be employed and only in cases of severe infection the plaster of Paris cast.

Permanent extension splint. Plateing of the leg in BRAUN's splints. Application of the wire at the tibial tubercle for the first 4 weeks, then attachment of the traction device at the thigh in order to avoid an over-extension of the knee-joint. As a rule, the weight employed for the traction device should not exceed 7 kilograms as otherwise it would lead to a separation of the fractured parts of bones and to a delayed growth of callus. The employment of too much weight with the permanent extension apparatus produces, besides infections, the most severe permanent damages. The support of the forefoot in order to avoid pes equinus and heel pressure ought not to be neglected.

Elimination of angulation. The varus position will be eliminated by abduction which, however, should not be too strong. In case of old fractures, the nail should be put crossways into the trochanter so as to cause a lever effect in the sense of the adductor movement of the upper part of the fracture! The recurvation of fractures of the lower third disappears as soon as the lengthwise traction is arranged just above the toes thus being located lower than the axis of the thigh.

Controls by X-rays. After 2 to 3 days, the first check by X-rays has to be made in order to ascertain whether the angulation has been eliminated and whether the traction is too strong or not strong enough. Movement exercises will begin the very first day. These will comprise unsupported movements of toes and ankle-joint to the full extent as well as movements of the hip by permitting the patient to assume a sitting position and active tensing of the thigh muscles.

As a rule, the duration of the fixation in the extension splint should not exceed 10 weeks. If the fracture is not sufficiently healed at that time, an unpadded plaster of Paris cast, which is to reach from the toes to the ribs, is to be made.

Application of a plaster of Paris cast in case of severe infections. If in spite of adequate drainage and exposure of the foci of suppurations, the high fever is not reduced after about 2 to 3 weeks, a fenestrated plaster of Paris wire reinforced cast has to be made.

Secondary septic hemorrhages. In case of a secondary hemorrhage from a large artery, an immediate amputation must be performed as otherwise the most severe infections possible developing into gangrene will set in. In case of hemorrhages, the profunda and other branches must be tied off. Tamponade and ligature at the place of choice are not sufficient.

Amputations. If the fever cannot be reduced after 4 weeks in spite of sufficient exposure and drainage of the foci of suppurations and the general physical conditions deteriorate in spite of the use of the large plaster of Paris wire cast, amputation must be performed.

Sequestrotomy. If there is a copious discharge of pus and if the roentgenogram reveals larger sequestra, their removal should be undertaken even during the first weeks; otherwise one had better wait until the fracture is firmly healed which will be the case in about 4 to 6 months. The operation is to be performed bloodlessly with complete exposure of all fistulas and elimination of bone hollows by chiseling in order that the soft parts can adjust themselves. The spaces are filled with vaseline, or unguentolan and loose skin sutures are placed. No tamponade, no rinsing.

Older thigh fractures. The correction of shortening and angulation is frequently successfully counteracted during the first three months by the permanent extension apparatus. Otherwise angulation, with presence of only a little callus, are eliminated by manipulation or with the aid of PHELP's belt, to be followed up later by the extension splint. If the fracture is firmly healed up already and if only minor infections are present, an osteotomy can be performed, possibly at the same time as the sequestrotomy. In cases of previous and more severe infections one has to wait for one year after the opening of the fistula before performing an osteotomy. It is best performed on a healthy bone. In case of aseptic fractures, the osteotomy may be performed at any time. If a shortening does not amount to more than 4 centimeters, KUENTSCHER's marrow nail can be employed.

Pseudarthrosis. The marrow nailing according to KUENTSCHER produces better results and is easier to perform than the bone grafting operation. In aseptic cases it can be performed at any time and in case of pseudarthrosis as a rule only one year after the closing of the fistula.

The extension stiffness of a knee-joint. It will be best removed through the quadriceps plasty according to BAYR.

The after-treatment. Movement exercises of the whole body will be performed when still in the extension splint. Combined exercises and sports are undertaken when still in the pelvic cast. Thereby, not only the physical condition of the body will be improved but also the mental attitude.

Discussion:

A. W. FISCHER: Likewise recommends the marrow nailing according to KUENTSCHER although with a particularly critical selection of especially suitable patients.

ROSTOCK: Objects to the immediately performed amputation of a limb in case of an injury to the femoral artery as a hemorrhage of the femoral artery is not synonymous with an indication for amputation.

SMIDT: Is of the opinion that KUENTSCHER's nailing method in cases of pseudarthrosis is restricted to cases without defect.

HAEBLER: Gives a report about his experiences with the KUENTSCHER nailing method.

9. Treatment of gunshot wounds of joints.

Directives.

Oberfeldarzt (Lt. Col., MC.) Prof. LAEWEN

With regard to the treatment of gunshot wounds of joints the following remarks have to be made:

1. A distinction is to be made between the treatment of new gunshot wounds of joints and the treatment of suppurations of joints due to gunshot. On purpose I avoid the expressions "infected gunshot wound of the joint" and "infection of joints". They are vague and give rise to misunderstandings. Also the expression "capsular phlegmons" does not describe accurately the actual conditions. Suppurations, originating in a joint, are no phlegmons of the capsular ligament. Only once, in surgery before the war, have I observed a real phlegmon of the capsular ligament in the knee-joint of a child, in other words, a suppuration in the loose connective tissue between the synovial membrane and the fibrious capsule. That, which is usually described as a phlegmon of the capsular ligament, is in reality a suppurating inflammation of the synovial membrane combined with a severe hyperemia and the discharge of pus into the inner space of a joint, a subsynovial edema and a developing phlegmon which in some cases, as for instance in the shoulder-joint, may be located all around the joint and in others, however, such as the elbow, hip and knee-joint, it might develop by extension from the inner part of a joint or from the canal of the missile into the connective tissue of the adjacent parts of the extremities.

2. In order to facilitate the choice of proper treatment X-ray pictures in two planes of new joint injuries and suppurating ones ought to be secured by medical units at the front, if at all possible. It can be ascertained that way, whether the injury of the joint is a perforating or penetrating one, whether the injury is just a plain injury of the joint or a fracture of the joint. With regard to the proper treatment of fractures of joints it is important to know, whether parts of the bone just split off or if we have to do with a cleavage of the bones reaching into the joint or even with the destruction of larger bone parts of the joint.

3.   The treatment of a <u>new</u> joint injury presents more
problems than the treatment of a <u>joint suppuration</u>.

In case of a <u>new joint injury</u> it must be decided whether
a <u>primary operative</u> or a <u>primary conservative</u> treatment is
the appropriate procedure. This problem was not solved dur-
ing World War I. Fundamentally it cannot be solved at all.
During World War I in the trench warfare on the Western Front,
i.e. under the most favorable conditions, PAYR, KLAPP, AX-
HAUSEN, MENNENGA among others suggested the radically per-
formed primary operative method as the proper treatment for
new gunshot injuries including also injuries of the inner
parts of the joints with complete closing of the capsular
ligament especially of the knee-joint. By contrast, con-
ditions in the present war, a war of movement as well as
a stationary war on large parts of the Eastern Front at the
present time, have led more and more to the adoption of the
<u>primary conservative treatment</u> method for new injuries of
joints. These treatments, forced upon us through difficult
external circumstances, frequently could not prevent the
development of severe suppurations of the joints. In how
far improvements might have been obtained in suitable cases
by the primary operative procedure, such as the prevention
of suppuration for instance, will be commented upon during
the discussion of the various injuries of joints due to
gunshot.

The treatment of <u>suppurating joints</u> requires an early
surgical opening of the inner joint and the continual ex-
posure of phlegmons spreading from the joint. In field
surgery, this principle stands unchanged even after the
introduction of the Eubasin treatment by FRUEND. <u>Phlegmons</u>,
originating from the joint, are symptoms of a disease by
themselves which are <u>not</u> influenced at all just by the
opening of the joint but which have to be suitably treated by
operative procedures. One has to know their stage of de-
velopment, subject to the principles of anatomy, in order
to open them soon enough after discovery.

Just as in the first World War, suppurations of the
larger joints caused by gunshot injuries, especially of
knee and hip-joints but also of tarsus-joints, raise again
the serious problems of their treatment. Exhortations to
<u>save the functions of these joints</u>, so frequently expressed
in the literature, have to be <u>disregarded many times</u> in
practice. With regard to these suppurating joints, the
problems should rather be expressed by the following question:
<u>How can I save the extremities</u> without even taking into
consideration the preservation of the function of suppurating
joints? - or, regrettably not infrequently, <u>which is the
right time for amputation</u> in order to protect the joint-
injured patient from a general infection, or to protect
him from an exhaustion of his strength which must lead to
his certain death?

4.   How is a <u>joint injury with the missile lodging in the
joint</u> to be treated? Should it be treated by the primary
conservative or the primary operative method? The most
important thing for any decision as to treatment is the
exact <u>localization of the missile</u> by an <u>X-ray picture</u> in

two planes. More comments will be given on the subject
during the discussion about injuries of the different
joints. A relatively uniform treatment method can be
applied to missiles lodged in the joints of a shoulder,
elbow or knee. Under the present conditions at the Eastern
Front, I see no indication for a removal by operation in
cases of fresh small entrance wounds occasioned by infantry
missiles or shell-splinters which are lodged in a bone of
the joint of in the inner parts of a joint. The same is
true for multiple small splinters lodged in a joint. The
danger of a suppuration of a joint and the possibility of
an infection due to an operative intervention must always
be kept in mind. Under the conditions prevailing on the
Eastern Front as observed by me, I advise the removal of
lodged missiles with small wound of entrance. Only with
an exceptionally good possibility to operate under aseptic
conditions if there is no rush, a primary removal of missiles
from joints with small entrance wounds is to be advised. The
situation is different if a large entrance wound and de-
struction of bone parts of the joint make the primary operation
a necessity. In these cases, the missiles, localized by
X-rays, shall always be removed from the articular space
or the cleft of a joint. If a case of suppurating joint
injury due to a lodged missile arrives for treatment, an
arthrotomy and the removal of the foreign body is always
indicated.

5. Of importance for the treatment of injuries of
joints due to gunshot is furthermore the question whether
the joint injury is the sole injury or whether other in-
juries exist. Simultaneous injuries of parts of the body
surrounding the injured joint as well as injuries farther
remote from the injured joint, which of themselves reduce
the power of resistance of the entire organism and which
make it doubtful whether the patient will overcome a sup-
puration of a joint, must be taken into consideration. In
such cases e.g. the suppuration of a knee-joint the healing
of which requires the best possible general constitution
of the whole body, one would be more readily inclined to
perform an amputation of the thigh than in those cases
where the suppurating injury of a knee-joint represents
the only injury.

6. The particular importance of an early and proper
fixation of the injured joint by plaster of Paris cast in
its various forms lies in the fact that it is likely to
prevent the suppuration of an injured joint as has already
been tought by BERGMANN. Even in cases of fever due to an
injured joint, a correct fixation which is best obtained
with a plaster cast may help to get rid of the fever with-
out the use of any other measures. One has to keep that
fact in mind when judging the chemotherapeutic treatment
of gunshot injuries of the joint. This fixation is of
equal significance in cases of injuries of joints due to
gunshot and treated by the primary operative method as in
operated cases of suppurations of joints.

7.   Premature evacuation of patients with injuries of
joints is very hazardous. After the unavoidable transport
to a field or any other forward hospital and an interval
of about 3 weeks, results will show whether a suppuration
of the joint is developing. If this is not the case with
regard to small injuries due to smoothly penetrating or
perforating missiles, the evacuation is a possibility after
those three weeks, provided the wounds are in satisfactory
condition. However, an absolute guarantee that a suppuration
of these wounds will not develop later on does not exist.
Patients with operated suppurative injuries of the joints
due to gunshots are transportable only if local examinations
indicate a gradual subsidence of the infection and when the
joint injured patients have been free from fever for several
weeks. KINGREEN has made the sensible suggestion to carry
these patients, prior to transfer, up- and downstairs several
times within the hospital in order to ascertain whether they
react with renewed increases of temperature. As a rule,
the general power of resistance of the body has suffered
during the protracted treatment of the joint suppuration
so that reserves do not exist to counteract a renewed
development of suppurations. We had many opportunities
to observe wounded patients, especially with injuries of
joints of the shoulders and knees, arriving at reserve
hospitals in serious conditions with high temperatures
who were supposed to be well enough to stand transportation,
but who actually developed severe suppurating inflammations
of joints during the transport.

I shall do my best to give you a rough outline of the
treatment of the different injuries of joints due to gun-
shot in due consideration of the prevailing conditions on
the Eastern Front.

1.   Treatment of injuries of the shoulder-joint due
        to gunshot.

a.   The treatment of a new injury of the shoulder-joint
        due to gunshot.

With regard to injuries with small entrance wounds no
operative treatment is necessary. Extensive damage to soft
parts caused by shell splinters should be treated in accord-
ance with the general principles of war-surgery including
excision of the entire wound and not of the skin alone. The
joint is not subjected to treatment. A suture of the capsu-
lar ligament is usually an impossibility solely for the
reason that the wounds, especially those at the back, are
too far remote from the capsular ligament. The wounds are
kept open. A drainage of the joint will not be undertaken.
The primary treatment with regard to the joint is, therefore,
a conservative one. Also in cases of fractures caused by
gunshot, and, even in larger injuries of the head of the
humerus due to destructive shots, the primary conservative
treatment is the treatment of choice; a resection should be
avoided. Even fractures of the head may heal up without
suppurations of the joints and without sequestra. A lodged
missile is no indication for an opening of a shoulder-joint

during the primary surgical treatment. Of imperative
necessity is the properly performed fixation of the in-
jured shoulder-joint with the abduction splint which is
to be fastened onto the thorax by a plaster of Paris cast.
In suitable cases, the transport difficulties of patients
with abduction splints can be facilitated by a firm fixation
of the arm to the thorax in a forward position at about
45 degrees to the horizontal line by wire splints and a
plaster of Paris cast around the thorax.

b. The treatment of suppurations of shoulder-joint in-
    juries due to gunshot.

In contrast to the treatment of new injuries of shoulder
joints due to gunshot with regard to the joint itself which
is conservative, the treatment of suppurating joint injuries
must be operative. The operation of the suppurating shoulder-
joint is done in two steps, the opening of the connective
tissue spaces surrounding the shoulder-joint, frequently
suppurating, which have to be kept open, and the actual
operation on the joint itself. The roentgenogram which can-
not be dispensed with shows whether the fracture site is
at the head of the humerus or in the articular cavity and
furthermore the exact location of the missile is seen if
the X-ray picture is taken in two planes. The missile,
lodged in the joint space or the cleft, is to be removed.

In case of comminuted fractures at the head of the
humerus, its severance from the shaft or its complete
destruction, the resection of the head is performed by
approach through the anterior resection incision with a
counter-incision on the frontally inserted dressing forceps
and drainage toward the posterior aspect. It is advisable,
in order to prevent a flail joint, to fix the shaft of the
humerus to the acromion in a slightly opened angle in a
forward direction by one or two wire sutures while in ab-
duction.

In case the head of the humerus is not damaged or if
only splinters came off at its axillary part or at the
edge of the articular cavity, I suggest the partial re-
section of the head of the humerus, resembling my condyle
resection method on the knee-joint, the technique of which
has been developed by my assistant WUETHRICH. WUETHRICH
makes the posterior resection incision and chisels off
the lower calotte with the upper arm held in horizontal
abduction (Epicondylus lateralis humeri in upper direction).
This makes an efficient drainage of the shoulder-joint in
the backward direction possible without the sacrifice of
the entire head of the humerus. I used to perform the
operation by approach with the anterior resection incision.
I take off the lower calotte of the head of the humerus
from the front, insert dressing forceps in a backward
direction, make upon it a counter incision and pull a
drain from the rear into the open joint of the shoulder.
I have observed really favorable results with this simple
operation at the front.

Pertaining to suppurating injuries of the shoulder-joint due to gunshot, dangerous phlegmons develop from the subdeltoid space in the musculature of chest and back and also occasionally in the wall of the thorax which have to be opened. ¹here are suppurations of shoulder-joints which have developed secondarily after an injury by gunshot and suppuration of the subdeltoid space. For those suppurations also, I recommend the calotte resection of the head of the humerus with drainage toward the back.

Cases of suppurating injuries of shoulder-joints due to gunshot are not transportable for a long period of time. In field hospitals, I have observed patients transported too early arriving in such serious condition that even the resection of the head of the humerus could not improve the situation and the outcome was fatal.

The fact that in case of a suppuration of a shoulder-joint, a fixation of the arm on the abduction splint lasting for months is a necessity until a firm ankylosis of the horizontally abducted humerus with the acromion has been formed in the articular cavity needs hardly to be mentioned here.

   2.   The treatment of an injury of the elbow-joint
        due to gunshots.

a.   The treatment of a new injury of the elbow-joint due
     to gunshots.

In case of lodged missiles causing only small entrance wounds and not attended by fractures, the primary treatment is conservative and consists of the fixation of the elbow-joint at a right angle to the upper arm and semi-pronation of the forearm (position assumed in writing). In case of more extensive disruptions of the joint and fractures due to gunshot, all detached or destroyed bone fragments will be removed conservatively. A closure of the capsular ligament is usually not possible. A drainage of the joint must be avoided. The surgically freshened wounds will be subject to open treatment. The typical total resection of the joint is to be performed only in case of comminuted gunshot fractures. Also in this case it is recommended to freshen the surfaces of the joint conservatively and to pay special attention to the triceps insertion. The total resection is hazardous and may cause flail-joints and should be replaced whenever possible, by the more conservative atypical resection. The early amputation is to be undertaken only in case of serious splitting of bone with simultaneous injury of the cubitalis artery, the interruption of which is frequently followed by gangrene. A splitting of the bone itself does not necessarily imply primary amputation.

b.   The treatment of a suppurating elbow-joint due to
     gunshot.

A suppuration of the elbow-joint due to gunshot may have an outlet to the exterior particularly in case of large wounds with attendant destruction of posteriorly located

parts of bone to such an extent that an outflow of pus
from the anterior articular pocket becomes possible. At
times, inspissations of these wounds cause an empyema which
develops especially in the anterior pocket of the joint.

In the back, phlegmons spread subcutaneously towards
the upper arm and forearm and have to be opened there.
Under pressure of the M. brachialis a break-through occurs
in front into the space below this muscle and continues
distally from here by way of the interosseous membrane
below the extensor tendon and the flexor muscle.

In case of injuries due to destructive shots, bone
fragments, very often in the stage of osteomyelitis, must
be removed. Through this intervention, sufficiently wide
openings will be created to permit a drainage.

In case of the presence of an empyema on the anterior
part of the elbow-joint, be it without an injury of the
bone or with small splittings or with destruction of parts
of the posterior bones, the arthrotomy of the elbow-joint
and its drainage is a necessity. The lateral or medial
incisions are suitable for this purpose. In the performance
of these incisions one comes easily into undesired contact
with nerves, however, especially the radial nerve, the
median nerve or the ulnar nerve, particularly, when the
anatomy of these parts is disfigured by large wounds. For
such cases and for empyemas of the elbow-joint in general,
I recommend the anterior longitudinal incision through the
biceps tendon and the brachialis muscle. In order to make
sure whether pus is present it is suggested to puncture first
the tendon with a thick, hollow needle to reach the anterior
articular pocket and the space below the M. brachialis.
Occasionally, in case of severe suppuration of the synovial
membrane, the pus has disappeared from the wound, but the
inflammation of the wound continues. In all such cases,
I recommend the following procedure: One splits the biceps
tendon in a longitudinal direction and the M. brachialis
in front of the elbow-joint and opens in this manner the
anterior articular pocket. After this, one inserts the
dressing forceps from the front, permits it to slide upon
the anterior surface of the lower end of the humerus inside
and outside and lateral incisions upon the tip of the
dressing forceps are made, through each one of which a drain
is pulled into the anterior articular pocket. In this
manner, every hazard to any of the nerves will be avoided.
The drainage tubes lie below the muscles and do not come
in contact with the nerve trunks. For the first four days,
I insert a T-drain through the anterior incision which I
remove later, in order not to overstrain the tendon. An
excellent rinsing of the suppurating joint is possible
through these three or two drainage tubes. The phlegmon
in front of the joint is also drained in this way. If
necessary, the lateral phlegmons can be opened and drained
by approach from the lateral incisions. The first fixation
of the joint is performed for the time being at a right
angle to the upper arm in semi-pronation of the forearm. If
there exists a chance of restoration of the function of the

joint, I perform careful movements of the joint during anesthesia of the plexus after a few days and fix the joint in a more obtuse angle. This procedure will be repeated several times during the after-treatment with fixation in different positions.

3. The treatment of injuries of the wrist-joint and carpus due to gunshots.

The injuries of wrist joint and carpus due to gunshots are usually accompanied by fractures, the extent of which can only be ascertained by X-ray.

a. The treatment of a fresh injury of the wrist-joint due to gunshot.

The treatment of many of the injuries of wrist-joints due to gunshot, particularly perforations by infantry missiles but also many with lodged missiles, is a conservative one. There are only few possibilities for use of the primary operative method. It consists of the excision of bruised or dirty edges of wounds as well as the removal of bone splinters and foreign bodies. A suture of the capsular ligament is usually impossible. The fixation is performed with the hand in slight dorsal flexion. Suitable plaster of Paris casts and banjo splints with finger extensions. As a rule lodged missiles are to be removed by secondary operation only when located in the radio-carpal joint. The total crushing of the hand makes the amputation of the forearm a necessity.

b. The treatment of suppurating gunshot wounds of the wrist-joint.

Only the radio-carpal joint can be drained which is opened best by the dorsal resection incision between the tendons of the M. extensor pollicis longus and the M. extensor digitorum communis according to LANGENBECK. If the seat of the suppuration is between the bones of the carpus, one or the other, sometimes a whole row of them, must be sacrificed in order to accomplish an adequate drainage. Likewise, attendant phlegmons of the tendon sheath, paraarticular abscesses and the deep forearm phlegmons have to be opened by operative intervention. With regard to a threatening ankylosis of the wrist-joint, the fixation of the hand should be undertaken in slight dorsal flexion.

4. The treatment of gunshot wounds of the hip-joint.

a. The treatment of a new injury of the hip-joint due to gunshot.

The participation of the hip-joint in an injury of the pelvis or the trochanter by gunshot can sometimes, especially in an injury of recent origin, not be ascertained even with the aid of X-ray pictures. An injury of the hip-joint is suggested by an increased pulse-beat of the arteria femoral below Poupart's ligament displaced in an anterior direction due to a hemorrhage within the capsular ligament of the hip-

joint as has been described by BERNHARD v. LANGENBECK as
a certain indication of an injury to the hip-joint. In
all doubtful cases the injury has to be treated as if an
injury of the hip-joint injury were a certainty.- The treatment
of a hip-joint is entirely conservative. small wounds are
also treated conservatively, larger ones are excised. Of
utmost importance is the immediate proper fixation of the
supposedly injured hip-joint; first by use of the field-
transport splints, by wire or any other emergency splints
which must extend along the side up to the axilla. This
has to be replaced however, as soon as possible, with a
pelvic plaster cast which must extend on the injured side
of the body from the ribs to the vicinity of the ankle-joint
and which must also fix the healthy hip-joint. Even in the
First World War, the early resection of the hip-joint was
not used and in the present war it is of no importance in the
primary treatment.

b.   The treatment of a suppuration of the hip-joint due to
     a gunshot injury.

     The treatment of a suppuration of the hip-joint and
of phlegmons caused by the suppuration is operative. The
possible methods are arthrotomy with a drainage of the
joint, partial resection of the hip-joint and resection
of the head of the femur.

     For the drainage of the joint in backward direction
KOCHER's incision may be used which has been recommended also
by PAYR and KLAPP. Starting with a skin incision which ex-
tends from the posterior edge of the trochanter major in an
upward direction toward the crista iliaca, one continues
deeper between the M. gluteus maximus and the M. gluteus
medius to reach the joint capsule between the M. piriformis
and the M. gluteus minimus. The capsule is then severed
transversely. If the head is not smashed or if there are
only damages at its lower calotte or fissures which extend
to the inside of the head or if only the margin of the aceta-
bulum is damaged, I advise the partial resection of the head
through the removal of a lower calotte. The incision must
reach the lower part of the capsular ligament. It is best
performed by a large diagonal incision through the lower
part of the M. gluteus maximus, pulling the N. ischiadicus in-
ward to reach the joint capsule, if one continues farther
into the depth along the edge of the M. quadratus femoris.
After the latter has been severed in the direction of the
neck of the femur, the lower calotte is chiseled off. In
this manner, a sufficiently large opening of the hip-joint
has been created into which a drainage tube can be inserted.
In a field hospital, I have witnessed a partial resection
of the head of a femur, performed by MARQUARDT according
to my incision method, in the case of a suppuration of the
hip-joint, which was not influenced by massive doses of
Eubasin and which was nearly healed after the fever subsided.

     In case of a total destruction of the head, LANGENBECK's
resection should be considered which may be replaced, ac-
cording to FRANZ, by a subtrochanteric resection directly

below the neck of the femur. If possible, the trochanter
minor should be preserved on account of its being the muscu-
lar insertion of the M. ileopsoas. In the hospitals at the
front, I have observed only a few resections of the head and
no subtrochanteric resection of the hip-joint at all. As
satisfying as the treatment results of the terribly sup-
purating wounds by the resection of the head of the femur
have been, the consequences of the permanent loss of the head
of the femur are just as regretable.

With reference to the arthrotomy of the hip-joint, the
most suitable type of bandage is the fenestrated pelvic
plaster cast or the extension bandage. Simultaneous in-
juries of urinary bladder, rectum or ilium sometimes render
the arrangement of a plaster cast more difficult and at
times make it impossible altogether. These cases generally
rate a very serious prognosis. After the surgical treat-
ment of these combined injuries, the patients are usually
so weakened that they cannot withstand further intervention
on the suppurating hip-joint.

The phlegmons which develop from the suppurating hip-joint
in a posterior direction in the muscle compartments of the
buttocks, and at times also extend in an anterior direction
below the muscle iliacus are difficult to treat. For the
drainage of anterior phlegmons the exposure of the retro-
peritoneal space is necessary. Posterior phlegmons are
opened best by an oblique incision through the lower gluteus
maximus. By this manner I have been able to open a phlegmon
which even extends behind the deep muscle plane behind the
knee-joint. Phlegmons, spreading from the hip-joint into
the musculature of the thigh, can extend themselves to the
bursa suprapatellaris below the quadriceps and thus may even
cause a secondary suppuration of the knee-joint. These
phlegmons are to be opened and drained by long incisions
on the outside and the front of the thigh or are to be
kept open by wound spreader.

5. The treatment of injuries of the knee-joint due
    to gunshot.

a. The treatment of new injuries of the knee-joint due to
    gunshot.

The primary treatment of injuries of the knee-joint
due to gunshot, not considering the surgical treatment of
larger wounds and the performing of surtures of the capsular
ligament, has usually been a conservative one during the
present war. Excellent experiences, made with the early
surgical treatment during World War I, have not exerted
any influence with regard to the treatment of new injuries
of the knee-joint in the present war. The early operative
treatment is a preventive measure, which, through a mechanical
excision of the contaminated canal of the missile up to the
capsular ligament, the chiseling off of bone surface and the
removal of foreign bodies and other carriers of infections,
attempts to rid the joint of intruding germs and by a complete
suture of the capsular ligament or a suture of adhering soft

parts tries to prevent a secondary infection. In view of
the present type of war on the Eastern Front we are con-
fronted with the problem of whether an operative treatment
of new injuries of the knee-joint due to gunshot is to be
recommended on principle, if it is objectionable, or whether
special directives regarding the indications for operative
treatment should be prepared. In my opinion, the latter
point of view should be adopted. The prevailing local con-
ditions, the possibility of an entirely aseptic operation,
the number of wounded arriving at the same time and last
but not least the technical skill of the surgeon determine
the advisability of the primary operative treatment of
fresh gunshot wounds of the knee-joint.

Pertaining to the present campaign in the East I estab-
lished the following principles for the primary surgical
treatment of new injuries of the knee-joint due to gunshot:

1. Absolute certainty about the kind of injury of the
knee-joint due to gunshot is to be established through X-ray
pictures. If an X-ray picture cannot be taken, the clinical
examination must suffice.

2. With regard to smooth perforations, especially
those caused by infantry missiles, or in case of lodged
missiles with samll entrance wounds or with small splinter-
ings of the femur condyles, the patella or of the edges of
the tibial joint surface, the primary treatment is the con-
servative one. Of particular importance is the reliable
fixation of the knee-joint best performed by a fenestrated
plaster of Paris cast or by a wire splint which is to be
fastened onto the thigh, the lower leg and the foot by
plaster bandages.

3. With reference to gross damage to joints, splintered
fracture of the femur and tibia or large wounds caused by
destructive shots in the area of the lower end of the femur
and tibia and at the head of the tibia, the primary surgical
treatment would be the correct one, especially when the
prevailing conditions permit an aseptic operation. The term
primary operative treatment means an intervention performed
within about two days. Therefore it can usually be performed
in field hospitals. The early operation, however, does not
consist alone in the excision of the wound and the suture
of the capsular ligament but it includes also the revision
of the inside of the joint. The excised canal of the missile
itself will be most useful for the arthrotomy incision as
it permits an approach to the joint and the damaged bone of
the joint. Completely detached bone fragments are to be re-
moved and new surfaces of bones have to be attained through
chiseling. Lodged missiles, deeply imbedded in the bone, are
to be left alone, splinters of fractures and splinters within
the joint cavity, however, are to be removed. The capsular
ligament is to be closed. At the discretion of the surgeon
the joint may be filled with an antiseptic liquid. Objection
is raised to the drainage of a primarily operatively treated
and closed knee-joint. Wounds of soft parts are to be kept
open. For that purpose I advise the use of improvised wound-
spreaders.

As a matter of fact, the primary operative treatment
of injuries of the knee-joint due to gunshot, successfully
employed during the last years of the First World War, is
only rarely used in the present war. That fact is proved
by the numerous cases of suppurations under treatment in
the field and reserve hospitals. There are cases among
them which give the impression that a properly performed
early operation especially the removal of bone fragments,
might have prevented a serious infection.

4. The typical resection of the joint is to be per-
formed in cases of severe intra-articular damages due to
destructive shots. It can be combined with the joining
of femur and tibia by a wire suture. Experiences made
during the First World War teach that the primary resection
of the knee-joint is superior to the secondary treatment
method with regard to the certainty of accomplishing satis-
factory results. However, the primary resection of severely
damaged knee-joints is rarely performed in the present war.

5. The primary amputation is to be undertaken in
case of extensive damage in the hollow of the knee-joint
with attendant perforations of vessels in the popliteal
space. Conservative attempts usually fail as in addition
to the original severe injury of the joint, gangrene of
the foot and the lower leg set in very soon. The primary
amputation is also necessary in case of extended smashing
of joint bones and of soft parts which do not permit a re-
section. I want to emphasize, however, that extensive
wounds of the soft parts on the side and above the knee-
joint, in other words belonging rather to the thigh, with
attendant tearings of the knee-joint but with only minor or
no injuries of the knee-joint itself, do not constitute
an indication for the amputation in the thigh as these
injuries may be cured by adequate excision of the wound and
the suture of the capsular ligament.

b. The treatment of suppurating knee-joint injuries due
to gunshot.
In my opinion, one should not lose valuable time with
rinsings or massive doses of Eubasin in case of empyemas
of the knee-joint after an injury by gunshot. One should
rather open the knee-joint and then perform appropriate
rinsings. The rinsing of closed joints with phenol-camphor,
rivanol or other antiseptic solutions is so unreliable in
accomplishing the desired results that I object in principle
to its employment in case of suppuration of the knee-joint.
It has to be admitted that also after less severe injuries
by gunshot suppurating synovitis does occur which at times
may react favorably to a treatment of rinsings of the closed
knee-joint. However, especially with regard to the medical
units at the front where one can observe newly developed
suppurations of knee-joints, one can never estimate the
consequences of this kind of treatment, particularly after
transports, in spite of seemingly favorable reactions at the
beginning of the treatment. The experiences made in reserve
hospitals with these protracted cases of empyemas of knee-
joints speak eloquently for themselves.

Opinions differ with regard to the most advantageous type of arthrotomy performed on knee-joints. On the basis of valuable experience gained in hospitals including reserve hospitals, I am taking the following position:

1. If an X-ray picture has not been made, an X-ray picture in two planes should be taken by all means.

2. Pertinent to plain suppurations of the joint without the presence of gross damage to bones, I drain the suprapatellar bursa starting with the customary two para-patellar incisions. Even during an anterior arthoromy, the upper end of the suprapatellar bursa is to be explored with the dressing forceps in order to ascertain whether an opening, reaching into a tube phlegmon of the thigh is present. If so, the thigh phlegmon is then to be opened immediately by long incisions laterally or anteriorally. After this, I flex the knee-joint slightly, proceed from the lower point of the patella in downwards and a little distal in order to find that place where I always perform the deep lateral incisions on both sides over the lower condyles of the femur and the articular space. In this manner, I am able to open both of the posterior joint pockets and remove from the front on either side a thick posterior calotte from the femur condyles. The preservation of the crucial liga-ments is of importance as they prevent a subluxation of the tibia. I also do not remove the meniscus articularis. It is not necessary. I drain the posterior articular spaces from both sides. To accomplish this purpose, I employed wound-spreaders from birchwood at the front which were made according to my instructions and which gave me valuable service. In reserve hospitals, wound spreaders of metal of better design and even elastic ones could be produced. With regard to a posterior operation it has always to be ascertained whether a deep or subcutaneous phlegmon of the calf is present which also would have to be opened.

Other surgeons are content to perform the arthrotomy of the knee-joint from the front and to remove the posterior parts from the side. Anyone who ever has performed a condyle resection from the front according to my system and who has convinced himself by probing with the finger the wide ex-posure of the posterior pockets will recognize the great advantage of this small bone operation as compared to the plain posterior approach.

Other surgeons again add another arthrotomy from the front accross the quadriceps tendon above the patella. I cannot ascribe particular importance to this method of opening of a joint, because the knee-joint is sufficiently widely exposed on all sides through the four arthrotomy incisions and the removal of condyles and it is easily ac-cessible for a treatment by rinsing.

Repeatedly I have been shown infected knee-joints at hospitals which were supposedly drained toward the rear. Starting with an anterior parapatellar incision dressing forceps had been inserted in a downward direction and an

incision had been performed upon it through which a drain
was later inserted into the knee-joint. A corresponding
illustration with the inscription "Drainage of Knee in
backward Direction" has even been published in literature.
This procedure arises from erroneous anatomical concepts.
Through an incision performed in this manner, the dangerous
posterior articular pockets cannot be opened because the
whole region of the epicondyles is situated extracapsularly
between suprapatellar bursa and the posterior articular
pocket. Such a drainage drains in a backward direction
only with regard to the suprapatellar bursa which, however,
is already sufficiently opened by the parapatellar incision.
Were one to drain the posterior articular pocket from a
frontal arthrotomy incision with the aid of dressing forceps,
then one would have to force the dressing forceps through
the articular space between femur and tibia an undertaking
which is scarcely a possibility. I consider also as danger-
ous the opening of the posterior articular pockets in a
backward direction into the popliteal fossa as the pus may
sink into this region and lead to a hemorrhage of the
popliteal artery.

3. TRAUBE (D.m.W. 1942, 982) as well as WESTHUES and
RUED (M.m.W. 1942, 736) open the joint wide from the arch
of Textor's incision, saw off a flat slice from the lower
end of the femur and in addition perform a removal of the
condyle by saw according to my system. This is an un-
necessarily large operation. The removal of the cartilageous
bone at the lower end of the femur is superfluous because
there is no danger of a flail joint. In most cases a firm
ankylosis of femur and tibia develops which, without any
sequestra, in a few of the cases even attains a certain
amount of flexibility. If the crucial ligaments with the
eminentia intercondyloidea of the tibia are smashed, which
happens rarely, I advise a limiting wire suture through the
femur and tibia from both of the deep lateral incisions
without any sawing off of bone ends as a means of avoiding
subluxation of the tibia.

4. With regard to splintered fractures at the lower
end of the femur or at the edges of the tibia joint surface,
also in case of not too extensive splintering attended by
infection of the knee-joint, I perform the anterior and
deep lateral arthrotomy, remove bone fragments, and always
chisel off the posterior femoral condyles. These cases
also, even though accompanied by phlegmons of the thigh
and the lower segment of the leg below the knee, can be
cured by this operation and the leg can be preserved.

According to data submitted by E. PLAAS at the reserve
hospital of the Surgical Clinic of the University in
Koenigsberg, among 33 cases of unnecessarily prolonged
suppurations of knee-joints after injuries by gunshot,
24 cases had fractures of the joints with phlegmons most of
which extended to the thigh and the lower leg. Of these 24
cases, 16 had been cured with the preservation of the leg,
4 were cured by amputations and 4 had a fatal outcome.

3 cases showed only fractures with attendant suppurations
of the joint without phlegmons. All of them had been cured
with preservation of the leg. 6 cases had phlegmons of
the thigh and lower leg with infected knee-joints but with-
out fractures. 3 had been cured with preservation of the
leg, 3 ended fatally. In all these cases, the operations
performed corresponded to the one described by me.

In case of fractures of the patella due to destructive
shots with infection of the knee-joint, the entire patella
has to be removed.

5. I object to the performance of the typical secondary
resection of the knee-joint in case of suppuration of the
knee-joint after an injury by gunshot. If both of the bones
are joined by a wire suture, the posterior drainage is not
sufficient unless the condyles have been chiseled off too.
If the two bones are not joined by suture, the sawed off ends
of the femur and tibia extend into the suppurating cavity
of the joint. Also by this procedure, a reliable drainage
of secretion, especially from the posterior parts of the
knee-joint, is not a certainty. For these reasons, I con-
sider the typical resection of the knee-joint an unnecessary
procedure as it does not offer any advantages when compared
with the fourfold arthrotomy combined with the removal of
condyles.

6. I do not perform the exposure of the knee-joint
as recommended by SCHLOSSER, which always makes a later re-
section of the knee-joint and frequently even an amputation
necessary, because it does not offer any advantages over
the type of arthrotomy recommended by me. According to
my observations, it is rarely performed in the present war.

7. Foreign bodies in the articular space and also
those in fracture clefts are removed during the arthrotomy
of the suppurating knee-joint. On the other hand, with
regard to missiles deeply embedded in bones, I do not ad-
vise their removal by chiseling as they, as a rule, do not
support the suppuration of the knee-joint and the removal
of them leaves unnecessary deep cavities which are difficult
to cure.

8. I have already referred to the great importance
of phlegmons in the thigh and the lower leg. Frequently
they are difficult to recognize as they are located deeply
and do not produce any inflammatory changes of the skin.
One has to be on the alert for their presence during the
arthrotomy as already mentioned. In order to keep these
sufficiently opened phlegmons in an open condition, I re-
commend the use of wound-spreaders. Rubber tubes are fre-
quently not sufficient for drainage.

9. A very difficult task is the fixation of the
operated knee-joint. Usually, one certain type of fixation
does not accomplish the purpose. Special splints for knee-
joints are not available in the hospitals. For field
surgery, difficult to produce splints can hardly be con-
sidered. If one makes a large, firm plaster cast exposing

only the actual region of the knee-joint, one cannot observe the development of phlegmons in the thigh and the lower segment of the leg. In order to investigate, the thick plaster cast has to be cut open which frequently is a very trying experience. After the phlegmons have been opened, the fixation again produces difficulties because there is not sufficient space for the plaster cast. These experiences have led me to the construction of the simple graduated splint, the latest type of which I have described in the Zentralblatt fuer Chirurgie (Zbl. Chir. 1942, 1569). It must be heavily padded especially in the region of the thigh. Only thin plaster of Paris casts which can be easily cut again, are applied on the thigh, the lower leg and also above the opened phlegmon. The foot also is kept in firm fixation by the plaster of Paris cast. This splint, permitting the exposure of the knee-joint for the purpose of rinsings, is supposed to be employed only for the critical time immediately after the operation. This splint is not a suitable transport bandage. When the knee-joint becomes quiescent, and the healing process of the phlegmons is progressing well, a fenestrated plaster cast should be put on again.

9. Of utmost importance is a careful after-treatment. One may apply bandages around the joint or just cover the wounds with dressing material, otherwise the method of treatment is the open one. I usually perform several rinsings daily of the open joint with Dakin or Rivanol solutions. A careful after-treatment and continual re-examinations for the purpose of discovering possible developing phlegmons is of decisive importance for the fate of these severely injured patients. Evacuation may be undertaken only after the patients have been without fever for **several** weeks.

10. When must an operated, suppurating knee-joint be amputated? With considerations of actual war conditions, an operation which accomplishes regularly the cure of a completely infected knee-joint is an impossibility. Of decisive importance with regard to thigh amputation, is not the fact that phlegmons are present or that fractures into the joint exist or the fact that a fever does not set in immediately after the operation but rather the observation of the patient and the judgement about his physical conditons in general. If one gains the conviction that blood transfusions are futile, that the physical conditions in general are deteriorating more and more without the discovery of new phlegmons or abscesses which would have to be opened, then the thigh must be amputated. Of particularly unfavorable portent are long, gross splintered fractures of the femur which extend into the joint, especially when a large piece of bone is completely detached as well as more extensive smashings of the head of the tibia. With reference to this kind of fractures with attendant severe infection of the knee-joint, rise in temperature and high pulse and a poor general condition, one would better waste no time with conservative operations on the knee-joint, but amputate immediately.

6. <u>The treatment of ankle-joint injuries due to gunshot.</u>

Injuries of ankle-joints due to gunshot, shell splinters and particularly by m·nes, are especially frequent in the present war. They are usually combination injuries with more or less destruction of the posterior tarsal bones with large wounds of the ankle-joints. Often they are bilateral.

a. <u>The treatment of a new injury of the ankle-joint due to gunshot.</u>

Injuries of the posterior part of the foot due to mines consist mostly in the destruction of calcaneus and talus with the simultaneous opening of both ankle-joints. The primary treatment is in principle a conservative one. The excision of the wound does not accomplish much. A primary removal of bone fragment is to be objected to as one never knows how many of these fragments might heal in eventually. Sutures of capsular ligaments are not possible. Wounds of the sole of the foot are to be kept open. The same principle must be applied to wounds of the metatarsus caused by destructive shots. Also in this case the treatment is fundamentally conservative. X-ray pictures are indispensable. Of utmost importance is the proper fixation of the foot in a vertical position in relation to the lower leg in slight supination. As injuries of the posterior part of the foot due to gunshot usually heal up with ankylosis of both of the ankle-joints, one has to be on the alert even during the primary treatment in order to avoid pes equinus. The ankylosis of the joints, with reference to the "Gehoof" is later replaced by a certain flexibility of CHOPART's, the tarsometatarsal, joint. The proper fixation of the foot using a fenestrated cast or plaster bandages is often a very trying job as there is little space for the application of the plaster of Paris cast on the injured foot.

b. <u>The treatment of suppurating injuries of ankle-joints due to gunshot.</u>

The course of treatment of injuries of ankle-joints with long protracted suppurations of ankle-joints, osteomyelitic processes and phlegmons is usually attended by fever which at times causes just as much anxiety to the surgeon as an empyema of the knee-joint. The operative opening and drainage of the suppurating ankle is usually to be accomplished only by the removal of the frequently also osteomyelitically diseased bone fragments or the sacrifice of one or more bones of the tarsus. One has to remove for instance the talus or one or more of the sphenoid bones or perform a resection at the bases of the metatarsal bones. The removal of bones at the inner or outer edge of the foot is to be avoided on account of the consequent occurrence of a wrong position of the foot in adduction or abduction. The talocrural joint is opened at both sides of the extensor tendons. Phlegmons of the sole are to be drained through lateral incisions. Not infrequently edema with multiple

small abscesses are encountered which have to be opened
by multiple incisions. I have never had the opportunity
to witness the dorsal opening of the entire metatarsus and
the tarsus by saw according to KLAPP-KIRSCHNER, but it has
to be kept in consideration.

The course of the fever is usually a very protracted
one and places strong demands upon the power of resistance
of the body. Unfortunately, in case of a threatening
general infection, the amputation of one or both of the
lower segments of the legs concludes the local treatment.

At times, chills occur during the course of treatment
which have their origin in suppurating thrombophlebitis
in the veins of the leg in the region of the tarsus. In
the case of an ankle injury of a young medical officer due
to multiple shell-splinters with attendant multiple sup-
purations, even the amputation of the lower segment of the
leg, performed by me, did not eliminate the chills so that
the general physical condition of the patient was endangered.
Only the ligature of the femoral vein below Poupart's liga-
ment brought about the sudden ceasing of the chills and was
conducive to the complete restoration of the patient.

7. The Eubasin treatment of joint injuries due to
gunshot.

With regard to the Eubasin treatment of injured joints
due to gunshot I take the following position:

The group of new injuries of joints due to gunshot
with sterile hemorrhages and the ones with turbid hemorrhagic
or serous contents in the joint must be separated from the
group of pure suppurations of joints. With regard to poly-
arthritis we know that the synovial inflammation can be
favorably influenced by large doses of aspirin. Therefore,
a treatment of new inflammatory reaction of the inner tissue
of a joint in the early stage with effective sulfonamide
preparations, as Eubasin for instance, is worth the trial
and might even obtain good results. FRUEND has applied
that treatment. Through a massive dose of Eubasin he has
performed, so to speak, a prophylactic treatment of these
new inflammations of joints. But, as he claims, he has
submitted to a Eubasin treatment also severe suppurations
of joints and phlegmons of the capsular ligament with
disregard of operations. He has removed only bone fragments
and opened secondary abscesses and phlegmons. With reference
to these methods the following comments have to be made:

1. Pertaining to the prophylactic Eubasin treatment
of still sterile joint hematoma or new infections, FRUEND
has not only administered strong doses of Eubasin but he has
also used aspiration and rinsing with rivanol and he has
also taken care of a proper fixation, especially by unpadded
plaster of Paris casts. The favorable reactions to these
procedures he ascribes to the Eubasin treatment. We know,
however, that the proper fixation as well as the aspiration
and rinsing have soothing effects upon joints with new in-
fections. For these reasons, I do not agree that the results
obtained by this combination treatment are solely due to the
Eubasin treatment.

2. With reference to suppurations of joints due to injuries by gunshot, I reject the pure Eubasin treatment even with high doses of Eubasin without a previous surgical treatment expertly performed. Of course, one can observe a subsiding of temperatures after the administration of high doses of Eubasin, the decline of temperatures, however, hides the real conditions of the joints. The process of suppurations of joints will not be influenced by it. The wasting of the body continues. It comes to the formation of abscesses and phlegmons and frequently, as I have observed, the proper time for an operative treatment has passed on account of this type of treatment and an amputation must be performed. If trials with sulfonamide treatments of totally suppurating joints due to injuries by gunshot are to be undertaken at all, they should follow only expertly performed surgical exposure. If effective sulfonamides do give a good account of themselves in this respect, one will gladly consider the employment of them as a valuable additional method for the complicated after-treatment of suppurating joints. Within these limits, the continuation of these trial treatments of suppurations of joints, due to actions of war, and initiated by FRUEND is to be desired. Inasmuch as the sulfonamide treatment of suppurating joints and wounds will always remain a kind of an additional treatment procedure the opinions, at all appearances, will always remain divided about its effectiveness.

10. Evacuation dressings.

Oberstabsarzt (Major, MC.) Prof. HELLNER

The evacuation dressing has to serve the following purposes: 1. Protection of the wound from secondary infection; 2. Fixation to counter any danger of pyogenic or anaerobic infection threatening any wound; 3. To render conditions as painless as possible. Fulfillment of points 2 and 3 also counteract shock. Pertinent to point 1: The protection of the wound is taken care of by a special covering of the wound with mastisol or adhesive tape as otherwise the actual bandage of the wound beneath the padded and more bulky bandage is frequently shifted. The consequence is favorable to a secondary infection. With reference to point 2: The necessity of fixation can never be emphasized too much. The fixation is accomplished by KRAMER's, PAPP's, VOLK-MANN's splints etc. The fundamental principle of any fixation that it be extended over two adjoining joints is frequently being violated. With reference to fractures due to gunshots, the fixation by splints is also of primary importance since for reasons of limited time and saving of plaster of Paris material, plaster of Paris casts alone can hardly ever be made use of. At the front, evacuation dressings without padding, especially the unpadded plaster of Paris cast, are prohibited even for the experienced physician. If a transport unit is being delayed for a longer period

of time, the bandage must be fenestrated at the wound site.
The fixation, so important for the wound, will be disturbed
by the unnecessary unrolling of the entire bandage. The
bandage of the wound must be so arranged that an examination
of the wound during transport is a possibility (phlegmons,
danger of gangrene, hemorrhages). Right from the start,
the fenestra must be so large that also the area surround-
ing the wound can be examined. The evacuation dressing,
to serve its purpose as a medium for rest and fixation,
should always be arranged with the idea in mind that it can
be left undisturbed for as long a time as possible. The
restful position and the painlessness of seriously injured
patients during the first transport are effectively sup-
ported by medicines. During transport in winter time, the
possibility of damages by cold has to be kept in mind. In
general, prior to a transport, one should first carefully
consider: a. whether the injured patient is transportable
in the first place, b. how long a time the transport will
probably take, c. what means of transportation are to be
employed (sleds, autos, railroads, aeroplanes). Disastrous
damages due to transport are more frequently occasioned by
careless selection of patients for evacuation than through
the inefficiency of transport units. A real danger is the
too hasty evacuation. Patients with conservatively treated
injuries of chest or abdomen should be held back for at
least 14 days, patients with infected injuries of joints
or fractures due to gunshots should be evacuated only after
overcoming the infections.

Directives.

The longer the distance to be covered, the more time
to be consumed by the transport, the more careful the
arrangement of the bandage has to be. In general, the
following directives with regard to evacuations have to
be observed:

1.   A special closing of the wound by a mastisol
bandage. For longer transports, no circular windings of
dressings because of the danger of hemostasis. The wound
must be accessible by a fenestra whose location is clearly
apparent and which is to be bandaged separately.

2.   The fixation by splints. Any kind of material,
suitable for splints, is to be employed. Always fix the
two adjacent joints on either sides at least, as other-
wise an insufficient fixation and a shifting of the splints
may take place. Improper fixation means a danger of in-
fection, a reduction of the power of resistance of the
wound itself in its fight against an infection and even the
possibility of shock during the period of transport. Always
good paddings in order to avoid pressure and hemostasis.
No unpadded plaster of Paris casts. Always physiological
relaxation positions.

3. Particularly careful selection of patients for evacuations. If possible, evacuation only after overcoming the infection. No evacuation of operated patients with injuries to brain, chest or abdomen due to gunshot for at least three weeks after an operation.

Special suggestions. With regard to new injuries of the upper extremities with attendant damage of bones and joints, DESAULT's bandage, reinforced by a half splint of plaster, is to be recommended. Pertinent to operated fractures of shoulder joints or upper arms due to gunshot, is the use of thorax plaster casts on abduction splints. With reference to new injuries of soft parts of the lower extremities, splint bandages are suitable. Pertaining to new fractures of the thigh due to gunshot injuries, splints of boards or WACHSMUTH's splints should be used for the un-injured leg. Surgically treated fractures of the femur as well as injuries of hip and knee-joints due to gunshot require the large, fenestrated evacuation dressings of plaster which have to extend from the line of the breast down to the toes and in case an extension bandage cannot be provided immediately. BOEHLER's sheet plaster will best serve this purpose. Injuries of lower legs are best taken care of by VOLKMANN's splints.

Every stump, the result of an amputation, requires a splint bandage extending above the next higher joint with a special protection of the stump from mechanical irritations. Concerning injuries of the floor of the mouth, the tongue or the jaws, special precautionary measures have to be applied for evacuation dressings through the use of a traction thread in the tongue, fila-ments. Tracheal cannulas are to be fastened carefully. Inserted permanent catheters must have large diameters.

II.

EFFECT OF COLD

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Heat regulation.

Oberfeldarzt (Lt. Col., MC.) Prof. RANKE

In addition to the known heat regulation (physical
regulation of the delivery of heat, chemical regulation
of the development of heat) it was explained that up to
300 calories are available in those parts of the human
body which are exposed to a cooling-off due to an inter-
ruption of the blood circulation (KOENIG) before any harm-
ful effects will arise. The same quantity of heat is
required to restore the normal temperature again: Re-
gulation of the distribution of heat. We do not yet
know much about metabolism in parts of the body subjected
to such treatment. However, we can say that serious in-
flammations will go hand in hand with injuries of the
blood circulation. While, according to HOLZLOEHNER, the
quickest possible rewarming of the entire body is re-
quired in cases of a cooling-off of the body, the circu-
lation has to be stimulated and restored to function first
in cases of local injury due to cold and only then should
the affected part be re-warmed. Furthermore the adapt-
ability to cold was discussed: Change of metabolism af-
fected by the thyroid gland, capillary exercises. Human
beings can better stand a short period of intense cold
than a long lasting but less intense cold. Full par-
ticulars of this lecture may be read in the "Klinische
Wochenschrift" 1943, page 113.

2. Prophylaxis and diagnosis.

Oberfeldarzt (Lt. Col., MC.) Prof. LOEHE

Prophylaxis is as important as the therapy of in-
juries due to cold. It requires the early procurement
and efficacious use of the protector against cold by
troop leaders and the physician. Where ever the troops -
according to the tactical situation - had the opportunity
to dig trenches in time, there were almost no signs of in-
jury due to cold. A regular supervision and training, par-
ticularly of the inexperienced recruits, is essential.
General hygienic precautions are to be met, hygiene as a
whole is to be practised as well as the hardening of the
body at the beginning of winter time. This proved to be
especially useful as the body becomes accustomed by and
by to low temperatures without suffering any injury. For
instance, the rapid fall of temperature in December 1941
had only a partly unfavorable effect; only some of the
soldiers suffered injuries due to cold although all were
living in the same circumstances, especially those who
were not used to cold and those with a poor blood cir-
culation such as those who had previously been office-
workers, while soldiers of peasant extraction were con-
siderably less endangered. It appeared again and again
that the troops should have been hardened against the
influence of bad weather during their training period in

the homeland or behind the front and thus be prepared
for winter battles. Only thus will the soldier be ac-
customed to protect himself against cold and be able,
better able to face, mentally as well, the possibility
of a combat during periods of extreme cold. This psycho-
logical preparation is rather important. Officers and
non-commissioned officers should be informed by the
physician about the development of apathy in the cold,
which refers to the increasing indifference of the soldier
caused by cold as regards the protection of his own person
from cold and from danger of the enemy. During winter
battle, which requires higher qualities of the individual
many cases of injuries due to cold may be attributed to
apathy, and are in that way self-inflicted. On the other
hand it was frequently observed that good officers and
N.C.O.'s much more rarely experienced injuries due to
cold though living under the same conditions, because
they were aware of the danger.

Hunger should be avoided and the internal protection
against low temperatures should be increased by higher
food rations. In this connection special consideration
should be given to the value of rich vitamin food, the
supply of cod liver oil and providing at least one hot
meal daily. Alcohol added to tea has proven itself use-
ful during periods of intense cold and moisture. An
excessive use of alcohol should be forbitten because of
the drowsy effect produced which may obscure an early
injury due to cold.

First consideration should be given to the early
issue of winter clothing. It should be adapted as well
as possible to the style of the Finnish clothing accord-
ing to the experiences of the past winter. Blouses and
trousers, lined with cotton pads, fur waist coats and
knee-protectors, head-protectors, still better fur-caps,
comprise the really necessary equipment of the rifle-man.
Fur coats, though reducing too much the agility in combat
action are indispensable for guards on duty. Shortening
the period of guard duty should not be overlooked.

Most particular attention should be paid towards
a good and well fitting equipment for the feet that
should include for every soldier, felt boots, provided
with leather soles to facilitate walking. The fitting
should be made carefully so that no moisture or wet snow
can enter the upper part even when two pairs of woolen
socks or foot-wrappings are worn. The ability to move
the feet and toes must be guaranteed. The supply of a
riding-type of trousers with lace-up legs, similar to
the camouflage-trousers, is to be recommended. Instead
of woolen gloves that quickly become wet by snow and
moisture, coverings of fur or linen texture or canvas
are urgently required and must be provided with three
separate compartments for the thumb, index finger and
the other fingers, so that any weapon can be handled with-
out hinderance. One should also be able to pull them
over the sleeves so that no snow can enter the sleeve while

lying down. In addition to a sufficient outfit of under-
wear, ear-protectors and protective head gear with sewn
in layers of cotton providing slits for the eyes, nose
and mouth are indispensable. Although it is admitted
that the opinions regarding the value of the ointment
for frost protection are divided, it is nevertheless true
that this ointment is offering an effective protection
against high degrees of cold. Even a regular application
of cold cream, containing only a little water, often
enough to just keep the skin soft, affords protection.

Special care is necessary in the evacuation of
wounded soldiers, to protect them against effects of
cold. Snow-drifts and impracticable terrains often made
it impossible to send the ambulances right to the first
aid stations which had to be installed near the front-
lines, because first aid in the lines was jeopardized by
the extreme cold and was limited to inoculations against
tetanus. The Russian flat sledges proved to be very use-
ful if protected against cold and wind by a suitable
cover. At greater distances, the transportation should
be relayed and hot drinks in insulated bottles should be
served. To cover the absolute requirements of warmth
for the wounded soldiers, caused by loss of blood and
shock, a sufficient quantity of woolen and fur blankets
should be available. Further evacuation to the main-dress-
ing station is to continue by motor vehicles that should
be heated before and during the trip by medium sized
chemical stoves. Small, fixed iron-stoves heated by char-
coal proved to be even more advantageous. The smoke pipe
is led through the side panel. The thermo pads, used by
the Russian Army, which develop heat during 8 to 9 hours
when moistened, have proved satisfactory on the whole.

As to the diagnosis of the effects of cold the
picture is so characteristic by its outer appearance and
by the history that errors are hardly possible. It should
be realized, however, that a strict classification into
the traditional and customary three degrees is almost im-
possible, as there exist many intermediate cases and it is
often not possible to make sure at the first examination,
whether or not deeper located structures of the tissue are
involved. Chilblains may at first sight be confused with
Lupus pernio, particularly when localized to ears, hands
and feet, and furthermore with Erythema which is, however,
easily distinguished from the regular resorptions, and
chilblains by its tendency to cicatricial atrophy, central
cicatrization, hyperemia at the edge as well as by the
small scales. Ulcerated frostbite can always be differ-
entiated from syphilitic lesions by the anamnesis, the
itching, the localization in areas where pressure is ex-
erted, as well as the co-existence of persistent chilblains.

3. Therapy of injuries caused by cold.

Stabsarzt (Captain, MC.) Prof. STARLINGER

The evaluation of injuries caused by cold should be adapted and coordinated to the tactical situation and should consider the physical and mental condition.

Effect of cold in general: Quick outer and inner heat supply (5 per cent solution of dextrose, 45°C. injected intravenously; fever therapy; if necessary artificial respiration with increased oxygen; slight rhythmical massage; elevation of will power.

Local effect of cold: The severity is often not recognizable at first sight; position at rest. Papaverin-Cardiazol tablets.

Effects of cold: 1st degree: Ointment dressing, protection against cold, alternating hot and cold baths.

2nd degree: Marfanil-Prontalbin powder; chemical and sero-prophylaxis (tetanus and gas-edema) drainage of the edema by salyrgan and by various incisions into the edematic parts; position at rest.

3rd degree: Shifting of the demarcation toward the periphery by intra-arterial, percutaneous injection of Eupaverin, continuous intravenous drip infusion of Padutin or Priscol, blocking of the lumbar portion of the spinal cord, sympathetic nerve, plexus or peri-arterial; fever therapy if increase of temperature fails to appear, zinc-gelatin cast up to the probable limit of the injuries caused by cold; contractures. Prophylaxis against infections, ligation of veins, local decrompression incisions, elevated resting position, massive doses of sulfonamides (30 grams within three days, added to soup); in case of threatening infection an early amputation is generally advised in the immediate proximity of the frost-injury; small transfusions of blood, care and support of the blood circulation, psychic guidance and obtaining permission prior to any amputation. As soon as a clear cut demarcation of the injury is established and if not otherwise contra-indicated, the demarcation amputation slightly above the necrosis will take place and will be followed up by an injection of TAT, gas-edema serum (desensitization) and sulfonamide-prophylaxis. After the operation, if the necessity arises: Delayed suture, active exercises, immediate prosthesis: Attainment-sport games and attainment-gymnastics; encouragement. In case of a "bad" stump and failure of all plastic or other means of cure, including surgical operations of the sympathicus, a delayed amputation with consideration of the professional requirements and according to the scheme of ZUR VERTH should be made. The medical objective concerning the treatment of frost injuries is the individual treatment of the patient avoiding any stereotyped measures in consideration of the interest of the community according to uniform regulations. It must finally be said that the best way to prevent injuries by cold is an energetic prophylaxis by the military command and the medical service.

Discussion:

LAEWEN: Pleads for the early removal of the dead tissue (after about 3 weeks) so as to shorten the healing process. BOEHLER is of the same opinion.

General instructions for amputation in cases of effects of cold (Excerpt).

1. The early amputation.

(Approximately 1.55 per cent of all reported cases of 2nd and 3rd degree injuries, equalling 8.97 per cent of the total of 3rd degree injuries, for the Army only.)

Indication for operation: Anaerobic infections; tetanus, also when spore elimination is only partly achieved (PIERINGER); general infection developing (deterioration of circulation, repeated chills, toxic diarrheas); severe, secondary injuries of the same limbs (destruction of bones or joints), injury of a main vessel and avulsion of the principal nerves.

Indication for anaesthesia: General anaesthesia (Ether, Evipan).

Indication as to the height of amputation: In case of gas edema the amputation should be made by cutting deep enough in the sound part, in all other cases as deep as possible and as high as necessary (LEXER). The scheme of ZUR VERTH will be disregarded.

Object of the operation: Freeing of the body from sources of spreading infection and poison by a single emergency operation, when in critical state and in shortest possible time with the view of creating wound conditions as propitious as possible with the least possible mutilation. Yet, life has to be considered first of all, before thinking of the limbs in particular or even of an especially desirable formation of the stump, which in most cases is not achieved finally.

Technique of the operation: Conservative incision in the sense of WACHSMUTH without double-esmarch (KIRCHNER) by means of a single circular incision without nerve shortening, bone-marrow scraping, shifting of muscles, or formation of loops. Fixation of an extension apparatus without any sutures but with exposure of all still possibly infiltrated muscular and vascular layers, as well as tubular abscesses by an appropriate splitting of the stump; in cases of thrombo-phlebitic veins, high ligature; Marfanil-Prontalbin powder; fixation in a position of rest. Repeated circular incisions are more injurious and more dangerous than the formation of sufficiently large and well-nourished lobules.

2. The amputation of demarcation.

Indication for operation: Clear demarcation; satisfactory defense and general condition and absence of contraindications, especially healthy vascular system and good blood circulation; no diabetes; blood count and sedimentation rate should not show considerable deviation from normal; operation will be practicable in about three or four weeks.

Indication for anaesthesia: General anaethesia (Ether, Evipan), or blocking of nerves.

Indication as to the height of amputation: Close above to the upper part of the demarcated area; arteriographical clarification of the functional state of the vascular system before and after intra-arterial injection of Eupaverin is desirable, trial-incisions as decay of tissue is often only superficial; only dead tissue is to be removed. Roentgenogram reveals the demarcation level of the bones.

Objective of the operation: By removal of all dead tissue, prevention of possible ascending vascular damage and of still possible generalization or at least spreading of the infection (late tetanus, late gas-edema) with a view of shortening the healing period (LAEWEN, BOEHLER). The extension of the curative treatment, the extent of the permanent damage, respectively the remaining working capacity and a maximum usefulness of the stump and its configuration are at stake.

Technique of the operation: Separation of the skin in the healthy area and of the bone as well only as high as necessary at the upper part to assure a reliable covering by the anterior and posterior lobes and to avoid a second operation; change of instruments after perforation of the parts near the demarcation; exact evaluation of the condition of the deeper situated tissues (connective tissue of the muscular and vascular layers, of the sheaths, nerves and joints). In the area of the foot preference should be given to the joint-lines, the cartilaginous surfaces will be removed, but the small bones will not be sawn through; special caution is necessary when closing the wound; Marfanil-Prontalbin powder; approximation-wire-sutures to be used at first, no knotting, over-rubber-tubing on both sides, position at rest. In case foreign matters or extensive infiltrations are still encountered operation should be finished in the sense of an early amputation.

3. The late amputation.

Indication to operation: Bad stump-formation after early or demarcation-amputation. Failure of all curative measures because of vascular diseases and its after-effects, trophic disturbances, diabetes, sympathalgias, abscesses caused by pressure of the prosthesis, contractures etc. if visible lobe plastic operation, double pedunculated skin lobes or skin transplantation according to RAVARDINO or BRAUN do not suffice to overcome the damage.

Indication as to anaesthesia: As for the amputation of demarcation.

Indication as to the height of amputation: BIER's test to ascertain anaemia of the tissue, scheme of ZUR VERTH, professional requirements to be considered first of all.

Object of the operation: Good final formation of the stump and the increase of working capacity of the patient.

Technique of the operation: Almost the same as in case of the demarcation-amputation, if necessary tenotomies, dislodging of the tendon channels, respectively shortening of sinews. The wound-closing by suture may be more complete. Further details concerning formation and evaluation of the stump are contained in the leaflet entitled "C Kaelte-schaedigungen" (cold injuries) dated September 1942.

4. Prevention and therapy of cooling effect.

Stabsarzt (Captain, MC.) Prof. HOLZLOEHNER

When exposed to cold water below 15 degrees Celsius, biologic counter-regulations become almost ineffective in animals and humans. The reflex rigidity, increase of blood sugar and acidosis is developed earlier and stronger in humans than in test-animals. In case of rectal-temperatures below 30 degrees Celsius, auricular fibrillation is regularly observed under these distressing sea-emergency conditions. Below 28 degrees Celsius, the human heart will often stop beating (Stress by dislocation of blood, increased resistance and viscosity). Medical therapy is senseless and useless in that case. Best results in humans will be obtained by hot baths. As a protection against cooling in cold water below 15 degrees Celsius a foam suit has been developed.

5. Pathology of the effects of cold.

Oberfeldarzt (Lt, Col., MC.) Prof. SCHULTZ

Reference is made of the detailed report of SIEGMUND (first conference "East" and Muenchn. Med. Wchschr., 1942 No. 39). The complications immediately following the effects of cold are of special interest to the field-pathologist, namely: suppurative thrombo-phlebitis, metastatic, articular suppuration, extensive phlegmons, frequent endocarditis (according to BOEHNE in 10 per cent) and as a general, but not clearly established sequela: nephroses in 50 per cent of all 3rd degree cold injuries according to BOEHMIG. No specific anatomical findings can be said to be generally prevailing in case of death due to cold. The displacement of the greater part of the blood into the internal organs, the absence of glycogen in the liver and the muscular tissue (LUCKE) but in spite of this an increase of weight of the liver (by cloudy swelling, according to BOEHMIG) is characteristic. SCHULTZ discovered waxlike degeneration of the muscles in 37 per cent of all autopsies in the cold season as compared with only 4 per cent in the warmer season. The exact examination of the suprarenal glands as described by REIN and KILLIAN was then considered as the important future problem.

6. Pharmacological evaluation of the medicinal therapy of local injuries, caused by effects of cold.

Stabsarzt (Captain, MC.) Prof. LENDLE

Medicinal measures intended to ward off local injuries due to cold must exclude the spastic stenosis of the arterioles and paralysis of the capillaries with a simultaneous increase of permeability. Remedies with a specific effect on the capillaries are not available. For the counteraction of the spasms of the vascular muscles quite a number of so-called spasmolytics are available, which are predominantly effective by way of direct paralysis of the smooth vascular musles themselves or by way of an excitation of the paralysing para-sympathetic elements. Any influence on the vascular width by blocking the central vasomotoric-tonus (narcotics) or by peripheral elimination of the nervus sympathicus (type of ergotamine) is not possible.

Acetylcholine and Doryl are para-sympathetically effective drugs which should be avoided because of their transient effect and because of their side effect on other organs; while on the other hand Prostigmin seems to answer well either by way of paralysing the esterase which splits the Acetylcholin, or by direct-parasympathetic muscle-effect increasing the blood circulation of the skin and muscles. Prostigmin has even when perorally administered an effect which lasts for several hours.

Among those spasmolytics which <u>directly paralyze</u> the vascular muscles, Papaverin is too evanescent and of an insufficiently reliable effect when perorally administered. Among the analogous synthetically produced isochinolin derivations, Eupaverin proved most satisfactory. A combination of "Eupaco" with Atropin which is in the trade is not essential for the therapy of vascular spasms, because Atropin has - when given in therapeutic doses - no effect on vascular dilatation.

<u>Priscol</u> (Ciba) has been recently recommended as a spasmolytic. It is a synthetic derivative of Imidazolin, which is a substance similar to Histamin. According to hitherto available reports Priscol does not have the capillary-injuring property of Histamin. It is said that it paralyzes only the arterioles and produces only an arterial hyperemia. Also when perorally administered, it is sufficiently effective. This effect when measured by the temperature of the skin lasts for several hours. The range of the effect is satisfactory. Increase of the secretion of gastric juice and the intestinal peristalsis have been observed as side-effects; these symptoms relate to a persistent effect of Histamin.

Finally the so-called circulatory hormones and various Adenyl-acid preparations which are also contained in organic extracts, such as Lacarnol, Eutonon, Myotrat etc. must be mentioned in this group of spasmolytics acting on the system of arterioles. The chemically not yet clarified Callicrein (Kallikrein) or Padutin which are said to be derived from

the pancreas, belong to this group too. All these compounds
have only a transient effect when parenterally administered
and have no reliable effect when perorally given. Their
side effects, when highly dosed, are insignificant and harm-
less. No preference should be given to them over Eupaverin
or Priscol. The supply of great quantities would encounter
certain difficulties.

The sexual hormons are the last pharmacological group
to be named. The effect of these hormones in preventing
vascular spasm has likewise been proven by experiments on
animals in the prevention of rat's tail-gangrene after
administration of Ergotamin. There is no explanation of
how this therapeutic effect comes about. The synthetically
produced Cyren has exactly the same effect as the sexual
hormones. This is a preparation of Stilben which has the
same hormone-effect in other respects. These efficacious
remedies may also be applied percutaneously as an oint-
ment.

Other local measures of therapy were not dis-
cussed. The remedies, likewise recommended for this, are
chiefly aiming at securing an improved blood circulation
(e.g. camphor, ichtyol).

All these remedies named above have to be applied
at the earliest stage of any frost-injury, in order to
maintain the blood circulation. Whenever there exist
serious capillary-injuries or whenever the insufficiently
nourished tissue is frozen throughout, the prognosis is
unfavorable and all spasmolytics have only relative value,
in that they might reduce the extent of necrosis. It
should, therefore, be required that the field dispensary
equipment, also set A, contain a sufficient quantity of in-
jectable spasmolytics and that in case of longer trans-
portations a sufficient supply for the injured patients
must be provided.

Remarks on this subject by Oberstabsarzt (Major, MC.) Prof. ZIPF

1. With regard to vascular spasms in case of in-
juries by cold the question is important, whether, besides
the re-heating to normal tissue temperature a therapy with
spasmolytics is indicated after all. For there exists
the possibility that the vascular spasm continuing after
the temperature restoration must be interpreted as a
physiologic counter-reaction in the sense of a vascular
contraction (subsidence of serous inflammation) and pro-
tection of the body against infiltration of cell decom-
position products into the general circulation.

Wherever a spasmolysis by pharmaceuticals is indicated,
prostigmin as the strongest remedy to interrupt the cholin
esterase and possibly sympathicolytics of the type 933 F
(piperi-domethyl-benzo-dioxan and others) may be used, all
of which are not attended with the disadvantageous side-
effect of the alkaloids of the ergot of rye.

2.   For the local therapy of effects of cold the
treatment with CO_2 gas seems to be suitable. According
to our experience with CO_2 gas baths a local, sharply
limited hyperemia of the skin and the subcutaneous con-
nective tissue may be caused thereby.

7.   Pharmacologic results in animal experiments con-
cerning local injuries due to cold.

Stabsarzt (Captain, MC.) Prof. LENDLE

It was the object of our experiments to prove the
correlation between the time and degree of exposure to
cold and the severity of the injuries of the rat's tail.
This did not prove successful. The investigation of the
influence of medicinal therapeutics on the rat's tail and
the rabbit's ear did not bring any convincing results.
These experiments led only to a certain insight into the
patho-physiological processes in case of an intense effect
of cold. The capillary system must be considered as the
principal site of injuries. This fact explains the oc-
currence of stasis, formation of edema, insufficient blood
supply to the tissue, formation of blisters etc. It was
authenticated by way of vascular biopsy, while thawing off
frozen ears, that the blood, contained therein is hemolyzed
and that vessel-dilating substances (FLEISCH) result from
the hemolysis; besides a histaminlike substance was bio-
logically proven. On circulating tellurit solutions
(direction by WELS) through the frozen ear preparations,
an injury, in the sense of the elimination of the reduction
capacity within certain layers of the skin was observed,
even when the susceptibility of the arterioles to adrenalin
still existed. Concerning the possibilities of influencing
the capillary permeability in the sense of a contraction,
it may be stated that no specific remedy having this effect
is known.

Discussion:

HANDLOSER: Pointed out the extraordinary importance
of instructions to fight the effects of cold and addressed
an urgent appeal to all officers of the medical corps and
asked them to fulfil also in this field their mission as
vigilant guardians of the health and to see to it that
every soldier is kept well informed on all the possible
preventive measures.

BREMER: The signification of the status dysraphicus
is pointed out, which often represents a constitutional pre-
disposition for injuries of the ends of the extremities by
cold. Nearly all patients suffering from pronounced dysraphia,
with cold hands and feet even before real damage occurred,
contracted the most severe injuries. 30 per cent of all
soldiers with frozen hands or feet were subjects of "status
dysraphicus".

HIPPKE: In case of general injuries caused by cold
the massage of the body following a hot bath is very im-
portant in restoring the normal function of the skin.
Cardiac remedies as well as others are unreliable. Short
wave therapy offers difficulties with respect to proper
dosage.

JARISCH: Reactive hyperemia of the arm following
ligature of the upper arm at 15 to 20 degrees Celsius
room temperature and concomitant observation of the tem-
perature of the fingers provides a means to establish
objectively the individual differences of vascular re-
action. There are three types of human beings: 1. Tem-
perature will rise above the starting point. 2. Tem-
perature will rise as high as the starting point. 3.
Temperature will not rise at all. The latter type is
peculiarly susceptible to low temperatures. (State of
dysraphia.)

BERG: Criticized the recommendation of alcohol as
a protection against cold. It is generally known that
the consumption of alcohol affords an agreeable sensation
of warmth in case of short exposures to cold. As set
forth, however, in reports on mountain physiology the danger
of injuries by cold increased appreciably after the con-
sumption of alcohol, as the peripheral radiation of heat
will be increased and the warning signals of the human
body will be depressed and the drowsiness, preceding death
by cold will be even more intense.

Sentries on duty during snowstorms are pratically
endangered by intense cold. When I - after having been
detailed to another unit - rejoined my former battalion,
fighting at altitudes of 1700 meters at the crest of the
Carpathian Mountains, I found 19 cases of injuries due to
cold. I then taught all non-commissioned officers of this
unit a special mountaineer's technique for preventing in-
juries by cold and have succeeded in shortening the period
of duty to 12 and even 8 minutes, so that, after being
8 minutes on duty the men actually has 16 minutes for
warming up and rubbing the extremities. In spite of the
continuation of the cold, the injuries by cold within
that battalion stopped abruptly.

SCHOERCHER: A distinction must be made between a
general cooling effect and local injuries due to cold.

According to the directions by HOLZLOEHNER, it is
quite allright to re-warm those men by a hot bath who
are seriously cooled off and who are in danger of life;
subsequent drops of temperature will also be avoided
thereby.

In case of local effects of cold that exist simultaneous-
ly with the cooling off in general, such a hot full-bath
seems to be a risk regarding the local injury of the tissue.
In that case the frozen parts of the tissue would be ex-
posed to a difference of temperature of 40 to 60 degrees
Celsius.

It, therefore, seems to be logical to leave those frozen parts of the body as for instance hands and feet out, and to protect them by a bandage.

There is, certainly, no danger to be expected from the slowly increasing general temperature of body and blood as a result of the hot bath, as a dilatation of the peripheral vessels is desired and encouraged by the administration of Prostigmin and Eupaverin. Directions should, therefore specify a quick re-heating with adequate protection of the frozen parts.

VOLHARD: Was of the same opinion as SCHOERCHER. A difference must be made between a general cooling down of the body and cooling of extremities. Whenever the body has been exposed to intense cold a quick re-heating by a hot bath may be helpful, whereas a quick re-heating of the extremities in that condition may lead to severe damage. The common remedy is the rubbing with snow. The idea is to keep the tissue cool the oxygen requirement of which in the cold is minimal until the circulation of blood becomes normal again by continuous rubbing and massaging.

The requirement of oxygen for the tissue is increased too early by quick heating and considerable damage would be produced by lack of oxygen in case of a still insufficient circulation of the blood.

BEUCHNER: We have examined the morphology of the adaptability to cold and the pathology of the cooling down in general in 20 cases of injury due only to cold with fatal outcome as well as in a great many experiments on animals and therefore are able to state the following:

In case of a continuous influence of cold with the heat regulation intact, the thyroid gland changes from a state rich in colloids into a highly active and a Basedowian state. In fatal cases, however, no changes of the thyroid gland have been observed but in most of these cases an atrophy of the lipoids of the suprarenal cortex is found which can also be observed in animals following an acute cooling off. In case of a long exposure to intense cold the suprarenal cortex dilates and becomes rich in lipoids. In case of an acute cooling off the glycogen of the liver, the skeletal muscle and the heart muscle is considerably reduced. Whereas the glycogen values of the liver and of the skeletal muscle after a long exposure to intense cold under normal conditions of heat regulation show almost normal values; an almost complete absence of glycogen will, however, be found in this case in the heart muscle. A vacuolar degeneration of various organs, an adiposity of the heart muscle, the kidney and the skeletal muscle reveal a general lack of oxygen as the cause of death due to chilling. The kidney never reveals a glomerulonephritis but an excretion of protein as well as storage of protein. Multiple erosions of the mucous membrane are very frequently observed in the stomachs of humans and animals which probably do not develop into chronic peptic ulcers.

Directions for injuries due to cold.

(Cover for the leaflet concerning prophylaxis, rec-
ognition and therapy of effects of cold; Army Manual 209/1.
From B 4 (page 19) the leaflet is still in force.)

In case of an exposure to cold the peripheral cir-
culation is decreased by the regulating mechanism and the
formation of heat is increased simultaneously in order to
maintain the necessary temperature for the vital organs.
The reduced blood circulation of the peripheral parts of
the limbs, causes in these parts a considerable drop of the
temperature giving rise to injuries (local effects). In
case of a severe or continuous exposure to cold, these reg-
 ulations will be disturbed so that the nucleus of the
body with its vitally important organs will be cooled off
(general chilling). At the same ratio as the temperature
goes down, the metabolism and the consumption of oxygen is
reduced as well, which increase again when the temperature
rises. A disproportion between the requirement of oxygen
and the blood circulation when warming up the body
therefore leads to injuries quicker than the cooling off
in itself. That is the reason why only the very quickest
re-heating or, this being impossible, the old-fashioned
method of slowest re-heating should be used.

Constitutional disposition: Vagotonic soldiers are
particularly susceptible to all injuries of cold because
of an abnormal condition of the capillaries and a specific
humidity of the skin.

External conditions: State of exhaustion, lack of
food and loss of blood, toxic infectious diseases, such
as, first of all, typhus.

It is distinguished between cooling off in general
(chilling) and local effects of cold.

Prophylaxis:

Containing instruction to troops as to the general
principles of hygiene, and use of equipment, care of
the body and clothing. No abuse of alcohol and nicotin.
Supply of food rich in carbohydrates and fat is desired.

A power of resistance of the body is obtained by
regular training. The best means for vascular training
at present is some kind of sport, gymnastics such as
Finnish Sauna baths, alternating hot and cold baths etc.

Constant hygienic care is very important, daily
wash of the entire body. In cold climates the soldier
is constantly to be instructed to watch his body; soldiers
should observe each other's nose, cheeks and ears. Attention
to drowsiness and indifference.

Intense muscle training in the calm, open air, whereas
when exposed to wind, it would be better to seek protection
by huddling together at a place protected from the wind.

No coddling of the body with regard to clothing.
Several layers of thin clothing are better than a few
thick ones, because of the air-isolating space between
them. Layers of paper and straw insulate well. Any pro-
tection against cold loses its effect, when the clothing
is drenched throughout. Clothing should, therefore, be
carefully dried as often as there is an opportunity to do
so.

Wind and moisture are particularly hazardous. In-
juries by intense cold arise not only during solid freezing,
but still more during the transition period of thawing.
Preventive measures consist in digging gutters to drain
the trenches in making wooden grates to stand on.

Evacuation of wounded soldiers: In case of intense
cold only absolutely indispensable transportations should
be carried through and then under constant supervision.
In each maneuvre of the transportation the wounded soldier
is seriously endangered as the period of transportation
and therefore the exposure to cold cannot be determined
ahead of time. Relay-stations for warming up and re-
freshments must be provided. Bedding on sufficiently
isolated layers (paper and straw). Protection of bandages
by blankets and paper, hot water bottles. Any drenched
bandage means an increased danger. En route, only dry
plaster dressings should be applied. No narcotics and
no adrenalin derivations to be administered. The vehicles
should be heated before use and be provided with heating
devices.

A.   Cooling off in general (chilling).

A distinction will be made between a quick cooling
effect, for instance cold water, and the slow cooling
effect with subsequent disturbance of the heart regulations
of the body.

The chief symptoms besides the timinuation of the
rectal-temperature are:

Slow cooling off	Quick cooling off:
Feeble, accelerated pulse or slowing down with si-multaneously strong sink-ing blood pressure, breath-ing slowed down; pale, sometimes blue-gray, spot-like marbled, cold skin, blueish lips and cheeks;	After an early acceleration of the pulse, the rate slows down and changes into an arythmia perpetua if the temperature of the body drops below 30 degrees; the surfaces of the skin, grown cool are white, the face often looks cyanotic;

Question to the surgeon: Symptoms of slow cooling off:	Apathy extending into unconsciousness and rigidity of muscles, disturbed sensitivity of the skin. Even the completely unconscious patient may still be saved as long as the muscle rigor exists.

Therapy:

Quick supply of heat inside and outside, until normal temperature of the body is obtained, is decisive. A danger of collapse, particularly in case of severe, local injuries, still exists for many hours.

a. Immediate measures:

If the respective facilities are available:

Hot bath at 40 degrees Celsius until normal temperature of the body is attained. Less effective are electrical radiation and hot air.

If no facilities are available:

Supply of heat by all means, yet, avoid burns (hot water bottles, etc., not hotter than about 60 degrees Celsius; temperature that can be tolerated by the fingers).

No analeptics. No adrenalin-derivations in particular. Hot drinks when consciousness has returned.

b. Further therapy.

Artificial respiration on drowned men, friction is favorable if skin is previously warmed. In case of exhaustion, glucose will be useful. A persistent control of the circulation of the blood and rest are essential.

In case of more intense, localized effect of cold, danger of collapse particularly still exists for many hours. This collapse will be treated in the usual way.

B. Local effects of cold.

1. Prophylaxis.

As shown under A. 1.: Prevention of peripheral disturbances of the circulation of the blood. All tight clothing, such as too tight boots, gloves, socks, garters and shoe-laces must be loosened. In case of temperatures below 15 degrees Celsius, steel-helmets should not be worn; this is particularly true with chauffers. There must be space enough for two pairs of socks inside the boot. The upper ends of the boots should be made tight against snow and water by short gaiters etc. Rubber boots should be lined with fur, felt, straw or canvas. 90 per cent of all injuries by cold effect the lower extremities. Attention should be paid in particular to a good care of the feet and the boots. Boots should be dried daily and greased once weekly. Daily foot-baths in cool water followed up by careful drying is especially important. In case of sweaty feet, formalin powder should be used after the drying and be sprinkled also inside the socks. Frequent change of socks.

Medical instructions with the view of interesting the soldiers in this problem and of keeping an eye on their comrades should be undertaken by the troop physician.

2.   Symptomatology.

The injury by cold develops in most cases unnoticed by a diminution of mobility, deafness and a reddening of the skin at the particularly effected spots. This reddening changes, while the injury progresses, into a wax-like paleness or a blue-gray color. Low temperatures and disturbances of sensitivity of the affected areas which feel doughy and rigid are characteristic. The peripheral pulse especially at the back of the ankle and on the inside of the ankle is very feeble or not palpable. The affected limb may even freeze finally.

3.   First aid in cases of local injuries.

In recent local injuries the grade and the demarcation of the injury is not clearly recognizable for several hours.

The blood circulation must be restored to function as quick as possible. This will be achieved no sooner than the cooling process has come to a climax, that is the reason why the therapy of the cooling down in general should be considered first. Then, the frozen areas up to their demarcations will be thawed by baths of 25 to 30 degrees Celsius increasing little by little up to 40 degrees Celsius, considering how the patient concerned can tolerate it. Under certain circumstances antiseptics should be added. Hereafter the limb will be kept in an elevated position and gentle exercises of movement should be instituted. As an after-effect of severe local injuries by cold a collapse may develop. Analeptics, except coffee, may be only considered after a general reheating. The danger of collapse may last for several hours.

III.

S H O C K   A N D   C O L L A P S E

Translation prepared by:

Office of Military Government for Germany (U. S.)
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Medical Section

1. Clinical picture and experimental investigation of shock.

Oberarzt (1st Lieut., MC.) Prof. DUESBERG

Many surgeons are of the opinion that shock and collapse must be considered as two different conditions. These colleagues used to call the condition shock if the reaction in general, especially the changes caused in the circulatory system, had no correlation to the severity of the wounding, i.e. if on account of its insignificance the wounding itself could not be made responsible for such a large implication of the whole system. As often described in the literature such shock-like conditions may occur even without physical trauma, e.g. if the respective person had merely been in a dangerous, or supposedly dangerous situation.

The physiological bases of these reactions will be better understood if one remembers the most harmless and everyday forms of shock. People used to speak of a nervous shock, meaning thereby that the person in question turns as pale as death, with cold sweat appearing on the forehead. The patient himself states, that he felt as if paralyzed with terror, and that he thought his heart for the moment was at a standstill. This condition varies individually as to duration, until the patient has overcome the fright. Then the body takes refuge in counter-measures, i.e. it combats the danger by offering resistance, or it retires to safety. Anyway, he gets free of the stupor, which is another name for shock, and passes over into a state of excitation and activity, i.e. into an irritable defense position. In forensic medicine this condition is known as "momentary fright reaction" during which the person is not in command of all his mental powers, and for this reason one is inclined to attribute extenuating circumstances to it.

In the course of our lifetime, everyone on some occasion or other happens to be frightened deeply, or has to pass through a danger or to face it. What are the particular kinds of feeling? The person holds the breath, thinks the heart to be at a standstill for a moment, feels the pulse beat in the throat, the face becomes pale, the vision fades, intestinal troubles arise and in the end faintness may be an additional feature. In short, a sudden neurovegetative change of regulation takes place. Quite the same process, yet with a stronger and more lasting effect, follows immediately after a trauma and is called a true wound shock. It is due to the change in the autonomous regulation that the human organism shows in a frightened condition, a behavior as if it had been exposed to a physical trauma.

The decreased speed of the pulse waves points to an increased tonus of the vagus during the shock condition. It is associated with the cutting off of the peripheral vascular regions and a decrease in the circulating blood. Due to the narrowing of the arterioles the peripheral tonus

of the vessels (W) is increased and the elastic tonus (E)
(tests according to the method WEZLER/BOEGER) is caused
to rise, the minute volume decreases and the blood pressure
is reduced due to a diminution of the amplitude of the
pulse wave. From the evaluation of the figures obtained
through the method referred to, and from experimental and
clinical findings it results, that in the case of vagotonic
changes in the circulatory system the supply of blood to
the vital organs, which are in direct association with the
lungs, is ensured, whereas more distally situated vessel
regions, especially the skin and extremities, may be cut
off to such an extent that the peripheral pulse is imper-
ceptible. A centralization of the circulatory system appears
to have taken place.

As it is worded in the clinical language there is a
peripheral collapse in the circulatory system during the
condition of shock. The general symptoms of a collapse are
the decline of the blood pressure, feeling of cold with the
skin turning pale, decrease of the output of the heart, and
the blood in circulation. From some hundreds of clinical
as well as surgical cases in wartime it would be ascertained
that at least four groups of collapse can be clearly de-
fined from one another, each of which in comparison with
the other one shows distinct deviations as to the function-
ing of the separate vessel regions (lungs, arterioles, cap-
illaries). Similarly, as in the weakness of the heart muscle,
the diagnosis can only be called perfect if the cause of
the weakness is ascertained (myocarditis, coronary stenosis,
insufficiency in the case of cardiac defects or hypertonia).
It will be necessary in the future to see in the word
collapse the wider clinical concept which requires further
subdivision. Anyhow, as far as this lecture is concerned
it may suffice to say that collapse as it enters into
appearance in the condition of shock deviates considerably
from the other types of collapse.

The collapse observed in the main dressing stations
and field hospitals usually shows the circulatory system
to be changed in its functions. A thorough analysis,
watching the further progress and lastly postmortem ex-
aminations, reveal that the changes can never have been
brought about by the action of shock, but must be due to
some other causes (loss of blood, fat-embolism, fulminating
infection, mechanically caused injuries etc.) (see Dtsch.
Mil. Arzt 1942, page 69, R. DUESBERG and page 76, G.
SCHALLOCK). It must be strictly rejected to give such
conditions the name "secondary wound shock" since the
poor functioning of the circulation is intrinsically
different from that in shock; moreover it is caused by
an indirect effect of the traumatic event, and by no means
directly as in shock. Cell disintegration products such
as Histamine can never be considered as the cause of a
true shock picture, since terror in no connection whatever
with physical injury may cause parasympathetic changes of
the regulation as well. The change in the circulatory system
which is caused by acetylcholine, the vehicle agent of the
vagus, differs in essential points from the collapse asso-
ciated with Histamine intoxication.

Slight horror, momentary fright reaction, street ac-
cidents, air raids at night and also wounding at the front
are stimuli varying in strength. They all may lead to
neurovegetative changes, varying from a slightly increased
tonus of the vagus to a full shock with fainting and eventual
death, i.e. shock with sudden heart failure (e.g. GOLTZ's
experiment).

The intensity of the reaction depends on the con-
stitution of the individual and its autonomous nervous
system, or it is dictated by the severity of the irritation,
which, as in wounding, may reach a highly unphysiological
degree. The irritation passes centripetally over to the
senses of feeling and impression, mostly implicating pain,
hearing, sense of equilibrium, and then reflexly jumps over
to the neurovegetative system without having reached the
consciousness. If the centripetal irritations are impeded
or excluded, as in narcosis, the shock reaction does not make
an appearance, or at least only in a very mild form.

Now the question may be raised whether a change in the
vagotonic regulation, such as occurs in shock, may be regarded
genuinely as an advantageous reaction. The explanations
given above were to show that in the case of an increased
tonus of the vagus the peripheral vessels are blocked off
and a centralization results. A sufficient supply of blood
to the vital organs is secured while the areas in the periph-
ery, chiefly the organs of motion, are put to rest, the
metabolism is reduced, consciousness and the senses of
feeling are dulled, due apparently to an insufficient supply
of blood to the cerebrum while the brain-stem with its vital
centers remains in good supply. As a rule, the clinical
picture of a freshly wounded man, or the aspect of a
wounded animal, exhibits a slight form or degree of such
a general vegetative change: exhaustion, desire for rest,
drowsiness, apathy towards the environment, laziness. If
such conserving measures do not appear automatically upon
the act of wounding, or only in an insufficient way, the
physician, in accordance with skilled practice, will ad-
minister morphine and thus narcotize not only the pain but
cause the vegetative functions to subside as well. The
expedience of an increase of the excitability of the para-
sympthetics is thoroughly described in connection with the
stoppage of blood by R. DUESBERG and W. SCHROEDER (Kli. W.
1942, page 981). Therefore the change of regulation as a
consequence of physical trauma must be regarded as a very
clever measure, one can say it is provided for physiologically.
The fact that this protective reaction may on the other hand
lead to exaggerations, such as shock and death due to shock,
must be ascribed, as already mentioned, to many absolutely
unphysiological stimuli which may impinge upon the human
body, and also to the respective individual disposition
which in its turn may be additionally influenced in a de-
trimental way by existing latent defects in the circulation
(coronary insufficiency, toxic-infectious damage of cap-
illaries).

Summary: By an abrupt intensive stimulation of centri-petal regions, as occurs in woundings, the tonus of the vagus is increased. In its mild form this change of the neurovegetative tonus may be regarded as a reaction of utility and protection for the human organism. Shock represents an extreme condition of excitement of the vagus, which may lead to sudden death. The collapse of the circulatory system, as in shock, is basically dif-ferent from the other forms of collapse. These, as to frequency, play a far more important part in practical field surgery.

2. New viewpoint concerning the pathogenesis and therapy of shock and collapse.

Stabsarzt (Captain, MC.) Dozent SCHWIEGK

It would go far beyond the scope of these discussions to touch on the details of the definition and general problems of shock and collapse. The widely varying dif-ference of opinion on the subject is due to the lack of uniformity of the definition of both manifestations. Par-ticularly in the foreign literature a distinction is made between primary and secondary traumatic shock. Primary shock is considered to be a condition following immediately upon an insignificant injury of highly sensitive innervated regions, as following a detonation or in terror impressions, and it is associated with circulatory disturbances. From a clinical aspect it deviates from collapse in its general form. Second-ary shock, the form which occurs most frequently in wartime, develops in a few hours after the injury has been inflicted and shows the true picture of a collapse. If only primary shock was called a true skock, as many surgeons do, and secondary shock was considered as one form of collapse, a clear-cut definition of both conditions might be possible. If, however, as is commonly done in surgical practice, secondary shock is considered as nothing other than ordinary shock - and this is in agreement with the general concept in the world literature - one cannot make any distinction between shock and collapse from a clinical point of view. The fatal issue of both primary shock and collapse must be attributed to a disproportion between the volume of blood in circulation and the full capacity of the vascular system. I have called this condition a relative oligemia. This dis-proportion is due to an insufficient flow of blood back to the heart, a decrease of the minute volume, a decline of the blood pressure and finally it leads, in a steadily increasing vicious circle to the break-down of the circulatory system. The disproportion may be compensated to a certain extent, the decrease of the blood pressure and the insufficient supply of blood to the cerebrum inhibited for some time by placing some strain on the regulation system, i.e. by causing the blood to discharge from its reservoirs, by prompting the peripheral vascular system to contract in the regions not absolutely of vital importance and lastly by forcing the influx of fluid from the tissue. But there will remain only two possibilities finally: either the volume of blood in circulation becomes too small, or the capacity of the vascular system too vast.

The most obvious reason for the reduced volume of
blood in circulation is the loss of blood. But apart from
this in almost all kinds of secondary shock and of collapse
the loss of plasma from the blood vessels and infiltration
into the tissue plays a predominant part. This is stressed
particularly in the Anglo-Saxon literature. In traumata,
burns, injuries due to cold, intoxications and infections
severe damage is done to the capillary system of the re-
spective regions. As a consequence plasma protein leaks
out of the capillaries. In this way the volume of blood
may be diminished by one half due to this loss of plasma.
Clinically it is to be noticed by a thickening of the
blood, the increase of hemoglobin and erythrocytes in the
blood, besides the formation of edema following trauma,
burns or effects of cold. This loss of plasma is added to
the loss of blood commonly associated with war injuries and
woundings. A reduction of the volume of blood in circulation
by one half, however, will usually be a danger to life.

Some details of practical importance may be cited here.
WILSON, ROOME, ALLEN made reference to the fact, that in
the use of the Esmarch-bandage, owing to a deficiency of
O_2, severe damage is done to the capillaries in the blood-
less region. When the blocking is lifted by removing the
bandage plasma protein will ooze through the walls of the
capillaries from the blood vessels, the result being a
fatal collapse due to the reduced volume of blood in cir-
culation. If an Esmarch-bandage is applied to a dog's hind
extremities for 5 - 6 hours to cause bloodlessness and then
released, there will be a decline of the blood pressure
and the volume of blood in circulation is proportionally
more reduced, the hemoglobin and erythrocyte levels will
rise and all this together will lead to death due to the
efflux of plasma from the vascular channels into the areas
previously rendered bloodless. I make reference to this
experiment because usually one thinks only of a possible
danger to the bloodless limbs when applying the Esmarch-
bandage, and not of the severe danger the whole circulation
is threatened with on releasing the bandage again, especially
if applied for too long a time and unless the bloodless ex-
tremity is to be amputated immediately afterwards.

A disproportion between the volume of blood in cir-
culation and the vascular capacity may also be caused by
dilated capillaries or veins in a large vascular region.
In this respect two points of view of former times require
some modification. Firstly, that in shock and collapse
a "hemorrhage" into the splanchic region occurs. With the
exception of damage done directly to the abdominal organs
by peritonitis or intoxications, no congestion of blood in
the abdominal vessels takes place, especially not in traumatic
shock. Secondly, the idea of a paralysis of the vasometer
center being the cause of a collapse cannot be supported.
Quite on the contrary active regulatory processes are ob-
served in most cases of shock and collapse indicating an ex-
cellent functioning of the circulatory centers. An insuf-
ficient cerebral circulation takes place only in the last
phases, due to the decline of the blood pressure and the
failure of the heavily strained central regulatory mechanism
which causes a complete breakdown of the circulatory system.

No doubt, from the periphery and some single organs depressor reflexes arise. As examples one may remember the collapse due to the tearing of the mesentery, contusion of the testes or pleural shock. Such reflexes are felt not only as sensitive pain stimuli, but they also remain active in narcosis. Such reflexes have been under consideration also in connection with traumatic shock. Unobjectionable proof by experiment, however, has not been furnished so far. An experiment which can be made any time may be mentioned here. If both hind extremities of a dog are injured by pounding, thus producing a traumatic shock, the blood pressure can be made to decline considerably by applying slight massage to one of the extremities, or by moving it. A similar process begins within 3 - 4 seconds after the application of a tourniquet. There is no doubt that this is a nerve reflex reaction. These experiments prove that reflexes reducing the blood pressure are active within the region affected by trauma, and they explain why a fatal collapse may occur during evacuation of inadequately splinted fractures. As to the relatively rare forms of primary traumatic shock, which occur with trauma implicating more sensitive regions such as the abdomen, testicles, etc., the nerve reflex factor doubtless plays a predominant part. However, secondary traumatic shock is the most frequent form of shock and collapse in wartime and in this case the escape of plasma into the tissue in addition to the common loss of blood is decisive.

As has become evident in the treatment of shock and collapse the remedies acting in a central or peripheral vasoconstrictive manner cannot alone achieve success. This is easily understood as the counter-regulation of the organism has caused the maximum contraction of the peripheral vessels already. A second possibility would be to increase the volume of blood in circulation by infusion, and this procedure has in fact become the rule in almost all cases of shock and collapse, provided that the fluid to be infused contains colloids which will retain water in the vascular channels, as is the case with preserved serum. The excellent effect which is achieved by blood transfusions is to be attributed likewise to a refilling of the vascular channels with a fluid containing colloids, and not to the erythrocyte content. Three factors should be considered in using the infusion of serum: Infusion of a considerable quantity of fluid, repeated infusion when the effect of infusion decreases, and using the infusion as early as possible. The results of such treatment so far observed have been statistically compiled by front-line medical units: At the top ranks exsanguination with 86 per cent favorable results; serious injuries to the limbs and the thorax region associated with severe shock follow with 72 per cent; gunshot wound of the abdomen with 66 per cent; dehydration and collapse in dysentery with 65 per cent; even in gas gangrene the figure was 67 per cent. Out of 1059 infusions given because of exsanguination, shock and collapse 74 per cent favorable results were reported. These figures do not require any further comment.

Now there is also currently available a certain number
of types of dry preserved serum. They offer the advantage
of not being affected by cold in wintertime, and in addition
they inhibit the escape of fluid from the blood channels
into the tissues, due to the hygroscopic power of the con-
centrated serum preparation.

Undoubtedly, in very serious cases of shock both the
treatment with serum and the transfusion of blood may fail
since the infused fluid will escape as well through the
damaged capillaries. Experiments made in conjunction with
SCHOETTLER showed an improvement in this process when adding
some hormone of the posterior lobe of the hypophysis to the
serum, hypophysin having a specific constricting and "tighten-
ing" effect on the capillaries. In my opinion the addition
of a hypophysis extract to the dry serum will improve results
even in the most serious cases.

3. Shock and the control of shock.

SS-Standartenfuehrer (Colonel, Elite Guard) SCHLINCK

Shock is regarded as a condition to which the human
body is exposed abruptly and unprepared, as occurs par-
ticularly frequently in wartime. As to the possible cause
there are mainly two points of view. Some support the
idea that the trauma acts via the neurovegetative system
in a detrimental way upon the organs of the body which it
controls. Others believe that the efflux of toxic matter
from the wound into the body must be made responsible for
the genesis of shock. There is also no uniformity in the
description of the clinical picture. The main reason is
that the predominant factor in the manifestation of shock
is the impairment of the circulatory system due to collapse.
This may lead one to assume that no difference exists between
shock and collapse. However, there is a basic recognizable
difference in the symptomatology of both conditions and
therefore there must also be a basic difference between the
two. In shock the wounded person is absolutely quiet, even
indifferent, the face looks worn and shows inflexible
features, the eyes, under half-closed lids, are indifferent
and stare at a far off place, the pupillary reflex is
usually depressed. Frequently the lips turn blueish. The
skin is pale and moist. The whole body feels cool. The
pulse is not high or only insignificantly accelerated, as
observed at the radial artery. Sensitivity is reduced.
Only after repeated and energetic requests or irritant ef-
fects will a slow but absolutely logical reaction set in.
Therefore there is no doubt a distinct difference as com-
pared to the picture in a severe injury associated with ex-
tensive hemorrhage or to the disorder of the circulatory
system in toxinaemia. It has been shown repeatedly by two
factors that both kinds of circulatory disturbances must be
kept strictly separated from each other:

1.   Any therapy of the circulatory system, especially the refilling of the vascular system by infusion or trans- fusion may be considered as a good means of differential diagnosis. The more promptly and favorably these measures influence the circulatory system, particularly in case of large hemorrhage, the less is the chance that one is dealing with a state of true shock.

2.   Macroscopically, it could never be determined in postmortems following shock that death was due to pathologico-anatomical changes. Rather there is the im- pression - although the impairment of the circulatory mechanism is the principal feature in the clinical picture of shock - that the real cause must be due to a disorder or injury of a central or superordinated organic system, that is the autonomic nervous system. Moreover, it could be noticed - and this is typical for shock - that the latter needs some time to develop the picture as described before. It was in those particular instances of shock which ended fatally and where the injury was in no correlation to the seriousness of the case, that the physician attending the wounded first gave a distressingly misleading report. And also just in such instances one was always "astonished" about the fatal issue of so "slight" an injury, especially as the general condition of the wounded person was considered so satisfactory before he had been removed to the main dress- ing station. The only method of treatment which we believe may be able to influence the development of shock is to supply heat externally and internally by administering hot drinks. In addition the wounded have to be kept under super- vision in separate rooms in order to keep any stimuli away from them. As to the therapy two observations may give some hint:

1.   Only in late autumn of 1941 and increasingly in the winter-time the fatal cases of severe shock increased in frequency. This was in a period where by preceding and current hardships the units were to a large degree exhausted and, due to the shortage of vitamins in the food, were out of nutrition equilibrium. This was evidenced by the in- creasing number of hemorrhages, due to gingivitis and para- dentosis.

2.   It was observed frequently at that time that the question was raised by members of the units to their medical officers concerning the decrease in their sexual power, which they noticed. This observation along with the knowledge recently gained as to the coupled relations between the vitamins and the hormones and the effect on the vital functions via the autonomic nervous system are apparently in a direct relationship with the increased incidence of shock. Due to the lability of the autonomic nervous system, in consequence of vitamin and hormone deficiency, even an apparently minor incident or trauma, such as slight wounding, or the trans- portation on Russian roads may be sufficient   to cause the lability to turn the situation into a total failure. In order to clarify this matter it will be necessary to investi- gate it in an unobjectionable and exact scientific way, as has been started with the formation of the Special Group of

Surgeons of the High Command. The viewpoints being basic-
ally different as to the definition of shock and collapse
and also regarding the interpretation of the causes, the
method of investigation requires a uniform course. It is
of no use to have the problem undertaken by medical officers
of the units and main dressing stations according to their
own liking, and based upon varying presuppositions. It
should rather be transferred to especially instituted "shock
committees" and these be directed to the various sectors
of fighting. These committees should be assisted by a
pathologist and, if possible, also by a physiologist.

The experience and clinical observations dealt with
above were made by a medical company on active service in
the East out of a number of more than 9000 transient cases,
a good 2/3 of which were wounded.

4.   Pharmacological aspects.

Oberarzt (1st Lieut., MC.) Prof. KOLL

The pathologico-physiological conditions of the cir-
culatory and nervous system, which are basis of the various,
and sometimes rather contradictory, clinical symptom com-
plexes of "traumatic shock" are very heterogeneous in
character. Therefore it is impossible to develop the
therapeutic measures with a uniform point of view. Diag-
nostic differentiation depends on very complicatied methods;
for this reason the adaptation of the therapy to the individual
case also meets with difficulties.

In addition it will be difficult to judge the suitability
of a distinct pharmaceutical preparation, since so far only
some of the conditions known as traumatic shock can be re-
produced in experiments on animals. This refers in the first
place to those conditions of shock that are due to most in-
tense sensitive and sensory impulses, designated by SCHWIEGK
as "primary wound shock". Their number is relatively small
and they are least susceptible to therapy by medicines, as
they either lead rapidly to death or soon show a spontaneous
improvement. Only as far as they are associated with very
severe pain do they last for a prolonged period and eventually
change to collapse. It is an important and advantageous
field of use for morphine, as this drug dulls the vasomotor
effects of severe pain impulses and inhibits any possible
existing pain hyperpnea, which via hypocapnia might open
the way for collapse. Whether or not a combination of
morphine and pervitin will show better results than mor-
phine alone cannot be decided as yet. At present the matter
is under examination from other aspects.

The characteristic feature of the so-called "secondary
shock" which may either be associated with loss of blood
or without it, is a progressive, more or less prolonged
stage showing increasing diminution of the circulating blood
volume compensated by a rising neurovegetative counter-re-
gulation until the latter reaches its climax. The process
ends in severe collapse, due to a failure of the vasomotor
centers.

Apart from the significance of a refilling of the circulatory system with blood or some blood substitute, as demonstrated by SCHWIEGK, some pharmacological therapeutic measures appear to be possible.

In addition to the seriousness of the trauma which causes the shock the functional power of the central vaso-motor regulation will determine the moment that secondary shock turns into severe collapse. In this respect consider-able individual variations are noticed on human beings. It will be possible and necessary, especially in vasomotor labile people, to prolong the interval of the counter-re-gulation considerably by administering central circulatory analeptics acting upon the circulation in the center in order to gain time for other measures. The increase of the vasomotor regulation under the influence of the ordinary analeptics stimulating the circulation centrally, such as cardiazol, corned or strychnine, does not reach its full height by considerable, though strychnine is very efficient. As I could demonstrate on the reflexes of the spinal cord, a considerable increase increase of the central regulation can be attained by combining remedies such as cardiazol or corned with strychnine. The stimulating effect of both remedies acts upon quite different elements of the central nervous system and this explains the considerable increase of the reflex power also seen at the vasomotor centers. Considering the prolonged period in the development from secondary shock into collapse, the relatively short effica-ciousness of the watery solutions of these preparations is a disadvantage, more so as the advantage inherent to them to act quickly under the circumstances is not absolutely necessary. A good and long lasting effect was observed by providing subcutaneous or intramuscular depots of strychnine dissolved in oil. I think it advisable therefore, to use such depot preparations also when administering strychnine and cardiazol - or corned - in combination. Pharmaceutical experiments on this effect are being made at present in the Institute for Pharmacology and Army Toxicology of the Military Medical Academy.

There is practically no prospect of success for medicinal measures if the traumatic shock has entered the stage of collapse. Analeptics acting upon the center will fail com-pletely. Sympathicotrope vascular remedies, such as sympatol, will have hardly any effect on the damaged vessels. Pre-parations of the posterior lobe of the hypophysis, as sug-gested by SCHWIEGK, should be used with great care, other-wise serious spasms of the coronary vessels may be the consequence..

5. The pathological anatomy of shock.

Kriegsarzt (War Surgeon) Dozent SCHALLOCK

Shock and collapse are clinical conceptions for distinct and, principally, functional conditions. As already mentioned before there is no uniformity in opinion as to these concepts. It is difficult therefore for the pathologist to choose a viewpoint concerning the problem of shock and collapse. The only possibility may be to investigate closely from a pathological aspect the details of such events as can be determined with absolute certainty from fatal cases of shock and collapse. From these cases conclusions a posteriori may then be drawn to mildly progressing forms which do not end fatally, and to those showing a doubtful clinical picture.

Sudden deaths, the classical type of shock, are well known to the forensic medical scientists and pathologists. In peace, as well as in wartime, their incidence is anything but rare; in fact, there may hardly be a pathologist who has not had similar experiences. Following quite a number of traumas of various kinds (blunt impact upon the thorax, head, neck, abdomen, sexual apparatus, cauterization of the trachea, sudden effect of cold and here one should think of death in cold water) death occurs suddenly to people in apparent good health. Postmortem examinations of such cases were made in this war after the explosion of mines and of various explosives detonating in the immediate vicinity of the persons in question. The external injuries incurred thereby could not be considered the cause of the sudden death. From the literature on the subject as well as from various reports submitted by SCHUERMANN, who is a very experienced man in this field, it can be gathered that special importance in the development of the condition must be attributed to concussions inflicted either on the whole body or on parts of it.

The pathologist can only take shock as the cause of death if he has made absolutely certain by autopsy that another - I might say "natural" - cause of death is quite out of question. As has been discovered frequently in post-mortems, where according to clinical records people had died of shock following trauma, they had been suffering from other severe diseases which just as well might have been responsible for their sudden death. In these cases the pathologist cannot take the condition of shock as being the cause of the death, since the presence of an anatomically recognizable disease is sufficient evidence to him to make death explainable. Quite the same remarks apply to woundings. Also in this case the definition "death in shock" can only be accepted if the nature and seriousness of the wounding excludes with absolute certainty that the wounding itself or its sequelae did not cause death. Considering the matter from this point of view, deaths due to shock after wounding are extremely rare.

As described in the literature (PONSOLD), and as confirmed by my own material, the anatomical aspect of shock is anything but characteristic. Neither macroscipically nor microscopically are there marked features allowing any conclusion. It is only on the basis of circumstantial evidence that the pathologist may assume shock. The latter can only be concluded from the circumstances, and not diagnosed from the findings in the organs. Also the dispersion of the blood (designated by ROESSLE as the geography of the blood) in contrast to that in collapse is anything but regular or in accordance with ordinary rules. Rather one obtains the impression (as expressed rightly by ORTH) that the flow of the blood was abruptly stopped. Thus the organs are filled with the quantity of blood they held at the moment shock occurred. Any redistribution of the blood, perhaps as a measure of regulation, had not occurred. One might straight away speak of a cataleptic standstill of the blood. Taking these anatomical findings as a base, shock may be presumed to be caused by a sudden, unknown as to its real nature, disturbance of the autonomic nervous system and its sequelae. The pathologist obtains knowledge only of the fatal cases. It stands to reason, however, that all kinds of conditions between the acute fatal standstill of the blood due to serious life-threatening events down to the really trivial cases must be considered.

There have been reports that the condition of shock is due to the wounding of limbs. As regards the fatal cases of shock this opinion must be absolutely refused. Two times on service in Russia the Special Group of Surgeons of the German Army High Command observed about 1500 gunshot wounds of the limbs, partly in frontline medical units. A number of them, who showed clinical symptoms of shock had a fatal issue. However, anatomically in none of them could a condition typical of shock be found. 6 of these 14 cases showed the picture of fat-embolism, 8 of severe hemorrhage. Similar statements are known from World War I (SIEGMUND) and were confirmed by several pathologists who also had the opportunity of performing autopsies at front-line medical units.

The anatomical picture of these cases described above can be differentiated from that of shock and collapse. A characteristic feature is the dispersion of the blood as seen in the state of hemorrhage, and, what is not so well known, now and then also with fat-embolism; the blood is concentrated in the lungs, the heart, the spleen and the brain, the skin is bloodless, and so is the mesentery, the kidneys and sometimes also the liver. Experiments on animals have shown that this condition, which must be regarded as a regulating process, may change to the picture of collapse, i.e. the peripheral vessels are dilated, associated with or without the efflux of a portion of the blood into the surrounding tissue. The collapse is marked by a regularly present cyanosis of all organs including the mesentery and muscular apparatus, with the spleen simultaneously in a contracted condition. The anatomical aspect of collapse and its sequelae on the organs is sufficiently known by the work of EPPINGER and especially that of SCHUERMANN and co-workers. Conditions of collapse are due to various reasons.

In experiments on animals they may easily be reproduced.
Without going more closely into the problem of collapse
it may be stated that the genesis of a severe collapse
may be due to a physical-chemical action upon the periph-
eral vascular system. We know that the tonus of the
capillaries is not controlled directly in a neurological
but rather in a physical-chemical way, and it is com-
prehensible that dilatations of the capillaries associated
with or even without capillary damage will occur if par-
ticular substances are formed in the organism or are intro-
duced into it from outside. As a matter of fact, such sub-
stances are found in greater or smaller quantities in every
wound and it is clear therefore that collapse is observed
particularly frequently after wounding. It is also true,
that such substances may be produced as well in severe
irritations of the autonomic nervous system, as is seen in
shock. This explains the change from shock to collapse.
If this idea on the nature of shock is correct the occurrence
of shock and collapse at the same time in one and the same
person is understandable. Varying opinions on the subject
may in many cases be due to this circumstance.

Discussion:

STARLINGER: It is absolutely possible, imperative and
justified to make a distinction between shock and collapse.
In order to treat the depletion of the circulatory system
as occurring in collapse, continuous drop infusions should
be used principally. In static warfare it can be performed
in the main dressing stations, in mobile warfare usually
no sooner than after arrival in the field hospital. It
offers advantages as follows: The circulatory system is
gradually refilled in a process extending over hours and
days, a change of the infusion fluid is possible (citrate
blood, preserved serum, periston, sugar or salt solutions),
chemo-therapeutic remedies, sera or medicaments can be
administered currently and besides the recovering heart
along with the whole patient are treated in a cautious way
and the demands on the attending personnel are less.

MUNCK: According to observations made in World War I
patients suffering from dysentery could not endure trans-
portation after large quantities of bolus alba have been
administered to them. The bolus mass formed stones thick
as one's fist and thus caused collapse en route just as
is known from GOLTZ's experiment.

IV.

M A L A R I A

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Malaria.

Oberfeldarzt (Lt. Col., MC.) Prof. ROSE

1. The effect of Atabrin prophylaxis

During the period of malaria epidemics in 1941 - 42 a daily prophylactic administration of tablets was introduced, on my suggestion, in the Airforce and in the Army. The fact that a daily repeated measure can be carried through more completely under the adverse conditions of combat, was decisive for the choice of the method. As far as the dosage is concerned, it was taken into consideration that the alleged advantage of a massive atabrine prophylaxis over a daily dose was not due to the method but to the difference in quantity of the weekly dosage. In previous experiments of daily prophylaxis 15 per cent less was given than in the massive dose. This difference is important if the additional quantity surpasses the critical threshold of efficiency. Only in highly dangerous areas, where at least 2 per cent of the persons under prophylactic treatment became infected, was the daily dosage increased to 0.1 gram atabrine in the Airforce. Critical situations were therefore quickly cleared up in the summer of 1942. A higher daily dosage should not be introduced generally as atabrine is very scarce and has a serious after-effect in that it stains the skin and causes unfavorable psychological reactions. It is of great importance to confine the prophylactic administration of drugs to cases where the danger of malaria infection is imminent. The inconvenience caused must be in a reasonable ratio to the risk.

2. Treatment.

In the few positively determined cases in which the relapses exceeded 50 per cent in tertian malaria treated according to the scheme (7 days 0.3 grams atabrine, the following 3 days 0.03 grams Plasmochin) it must be borne in mind that this percentage refers to patients under prophylactic treatment in a period of latency (Spring disease). The "spring disease" of a patient under prophylactic treatment is rather a relapse than a primary attack, the onset of malaria probably having been suppressed the year before by prophylactic and definitive treatment. Patients relapsing for the first and second time do not recover parasitologically at the same high percentage under the normal treatment as is usually observed in primary attacks and late relapses. A pronounced tendency to relapses cannot be counteracted by an increased atabrine dose. It is unnecessary to repeat experiments to that effect as this has positively proved inefficient. An increase of the atabrine dose is likely to affect the central nervous system. A larger dose of Plasmochin, however, will probably cut down the number of relapses. A simultaneous treatment with 0.3 grams atabrine and 0.03 grams plasmochin is recommended. In order to avoid abdominal colic, the plasmochin must be administered parenterally during the 7 days of treatment. We refer to the chinoplasmin treatment which in former times has proved satisfactory in that it reduced the number of relapses considerably. It is not advisable to treat malaria

with pure quinine, or to treat tertian malaria with Neo-Salvarsan, which only holds the vivax infection down but will never cure it parasitologically.

3. Provocative treatment is prohibited in the Air-force, as this is considered worthless from the diagnostic and ineffective from the therapeutic point of view. Soldiers prone to relapses will be employed in such places where they can be hospitalized at any time.

4. Malaria and blood preservation.

Examinations carried out by WOLPERT have shown that the malaria parasites are active in the preserved blood as long as the latter is useable. (Successful self-injection carried out by WOLPERT with preserved blood kept for 90 days). Persons who might be suspected of latent malarial infection, because of previous infection, are unsuitable as blood donors.

5. The malaria disinfection has to be carried out in those places where infected Anopheles are expected. Such areas have to be treated regularly with pyrethrum preparations such as "Detmoli" and "Flit". The use of hand spray guns is not advisable as they wear out too quickly, the pressure is too low and the equipment is tiresome to handle. A new device for destroying Anopheles was designed by the Airforce, it consists of a motor-pump and a spray gun and is much more effective. A longer pressure tube is necessary in case of gasoline engines (about 15 meters) being used in order to prevent the exhaust gas of the engine from interfering with the spray.

2. Malaria.

Oberstabsarzt (Major, MC.) Prof. MEYTHALER

The essential content of this report is found in booklet 6 (1942), Directives on Tropical Hygiene.

3. Malaria.

Oberstabsarzt (Major, MC.) Prof. MARTINI

This war has afforded us the opportunity of examining the efficiency of the synthetic malaria remedies in a mass-experiment, which was based on the experiments made in peace-time. But it did not bring anything new to those who fought in the malaria infected districts in World War I. The period of relapses and latent infections started in March and reached its peak in May and June. In central Greece, on Crete and other places it started somewhat earlier.

The spring epidemic is almost exclusively caused by tertian malaria. This did not surprise us. Very few fatal cases due to tertian were reported. The tropical cases, which occurred very rarely, were much more dangerous.

Some physicians are inclined to ward off the high percentage of relapses by more intensive therapy, but that way they get in the old wrong rut of the last century. It is the progress of the 20th century that it was recognized after numerous experiments that larger doses might prove harmful rather than increase the efficiency. The smaller doses were then given preference and NOCHT was one of the most fervent advocates of this therapy. Before World War I the results obtained with 3 x 0.5 hydrochloride of quinine were excellent. In my opinion, the sometimes high percentage of relapses observed after the administration of quinine were unduly emphasized. Under war conditions the percentage of relapses due to the administration of atabrine may also be relatively high. It is, however, not worthwhile to enter into a debate about the differences. We refrain from using quinine in any case, as we only have a sufficient supply of atabrine. Even the follow-up massive dose of plasmochin does not prevent relapses entirely but according to the opinion of most physicians it is effective enough that it should not be omitted. An improvement of the general condition of health during the treatment seems to be very important. Whether the mentioned 50 per cent of relapses occurring with the old quinine therapy compared to 25 - 30 per cent of relapses occurring with atabrine-plasmochin therapy are based on comparable figures or not is of no avail in this connection.

There is no treatment for malaria that could in any way be called a therapy magna sterilisans. It is also known that malaria which occurred during World War I subsided after some time. How long it remains in the body is not certain. It is important to note that malaria in Germany does not essentially reduce the ability to earn a living after some years have elapsed and that the dangerous tropical malaria showed much less tendency to relapses. There is no reason to be pessimistic about the curability of malaria.

We know that in contrast to the Italian and French, the English do not think much of prophylaxis. Lately, however, the English seem to have changed their opinion. Even in Germany there are many physicians, who are quite pessimistic about prophylaxis because of the great number of infections which occur all the same. These cases were expected, but they are not exclusively due to errors in the prophylaxis, although suspicion is well founded in this respect.

During World War I the French had their flying malaria commissions, which quickly were at hand, wherever numerous malaria cases occurred and they examined the urine for quinine. If many negative results occurred, the leader of the unit was punished. The French considered this very useful. As prophylaxis does not counteract the infection itself, but only

the clinical symptoms of malaria, there is the risk that
malaria stifled by prophylaxis, remains untreated in the
troops and breaks out on special occasions, for instance
at home where the patient is sometimes erroneously diag-
nosed. Therefore it is necessary to send the patient
to military or even special hospitals as soon as malaria
is suspected.

The numerous latent infections endanger the new arriving
troops. Latent malaria is not only found in persons who
have been taking prophylaxis, but also in such persons
who often are not aware of any malaria symptoms. These
plasmodium carriers are the most difficult problem in com-
batting malaria. They will neither be discovered completely
nor can they be eliminated by prophylaxis or treatment
while free from symptoms. Such healing attempts called
"final treatment" were perfectly useless, as far as the
results have become known and it only means a waste of
drugs. This result was not surprising, especially if the
atabrine resistant E-forms are considered as a transitional
stage.

If we expect that something between 25 per cent and
75 per cent of the infected soldiers are protected from
disease by taking prophylaxis and thus able to do their
duty, this result has in any case to be taken into con-
sideration and it may sometimes even be decisive. It would
be desirable to increase the prophylaxis, although the
opinions in this matter are divided.

A second deficiency, characterizing all prophylactic
administrations of drugs is the difficulty of carrying
these measureas out consistently.

Therefore, the danger of infection must be eliminated
wherever possible. The control of the disease is based
on the destruction of mosquitoes. The instruction for
these control measures will be issued by the proper author-
ities. The efforts of entomologists and technical experts
in this direction cannot be dispensed with. The importance
and ramifications of the task which often makes it necessary
to amend and reorganize the malaria service of the occupied
countries may require more experts in the near future than
have been trained thus far.

It is an important task to attach the fullest attention
to the sanitation of terrain and gauze protection of the
billets. The "spleen-index" and the condition of fever-
gnats must be investigated in those places, which are of
strategic importance, in order to get correct statistics
concerning the incidence of malaria. The incidence of
malaria was low among our troops, where control measures
were effectively employed. The spread of malaria in the
Greek population has increased this year. Everybody must be
firmly convinced that these preventive measures, which cause
great trouble, are an absolute duty for the soldiers from the
viewpoint of comradeship, of responsibility and of discipline.
It is most important to convince the troops of the necessity
of these measures.

Malaria was on the whole not so wide spread during this year in comparison to the last war. Naturally failures could not entirely be eliminated but no serious injuries among troops occurred.

In spring, it seemed to me that during the malaria epidemic in Greece, consisting exclusively of tertian cases, the soldiers were hospitalized too long, half of the time used for treatment would have been sufficient on the average. Some of the soldiers suffered from a latent tertian infection due to their bad general condition of health, and others showed a bad condition of health because of being hospitalized only after their 4th and 5th attack of malaria. In such cases a supportive treatment for some weeks is advisable. On the whole, the patient suffering from tertiana is able to resume duty soon after he is freed from fever and vivax. In some reports the opinion was expressed that relapses will be the more rare the longer the patient is hospitalized. The small number of cases serving as a basis for this assumption cannot be considered as sufficient evidence. The fact that the diet in hospitals should exercise a favorable influence on the general condition of health, which represents an important fact in the final healing process, does speak in favor of the above mentioned assumption. The real question is if the same degree of convalescence can be obtained in the lines or in reserve formations, which are located closely behind the lines. Malaria and especially tertiana were, if possible, treated right in the front lines during the World War I in Macedonia. If the treatment of malaria would only take half of the time on the average, there would be only half as many soldiers on sick call.

A strict isolation of patients in hospitals is observed because of the danger of unrecognized tropica. The key to progress lies in the ability of the surgeons in the front line and in the presence of a sufficient number of facilities for differential diagnosis in reach of the troops, which make it possible to distinguish the different cases and so to keep the patients suffering from tertiana in the front line. It is a great pity that among 100 cases of tertiana probably one case of unrecognized tropica ad exitum may occur. But this fact does not justify permanent military measures.

Hence it follows that the question whether the patient is to be evacuated or kept in the front line, depends on the type of malaria and on the military situation. On account of the experiences gained in three war years regarding malaria it seems advisable to decentralize the personnel capable of deciding on the treatment of malaria patients.

For this purpose, a thorough training of the medical officers for judging and treating malaria in the malaria districts should be instituted in the same way as is the rule in other medical fields. The malaria instruction unit is indefatigably working in this direction. This point will be of special importance because of the extension of the theater of war in the South and Southeast so that an increase of personnel and a strengthening of the whole organization will be necessary.

The prevention of malaria will at any time be backed up by military authorities who are fully aware of the fact that epidemics can become enemy No.1 and many wars have been lost through epidemics.

The Army has, on the whole, dealt satisfactorily with malaria. In some ways fortune smiled upon them and on the other hand careful preparations applied at the right time kept this enemy under control.

4. Comments on the discussion on malaria and amebic dysentery.

Oberstabsarzt (Major, MC.) Prof. HAUER

In contrast to the expectations of ROSE that the tendency to relapses of certain well treated malaria cases are probably due to bad atabrine prophylaxis, I would like to present the following observation:

The malaria relapses are on the increase in the hospitals, under my command. On a certain day, 25 per cent of malaria cases were relapses. Among them were a great number of patients who were thoroughly treated once or several times partly with alternating methods. This case material, as a matter of fact, is particularly suitable for a critical retrospective examination. Since the beginning of the war, we make one or several serological examinations on each malaria admission. Impressive observations have shown that almost 92 per cent of our malaria relapses showed negative Wassermann, Meinicke and Kahn reactions. A simultaneous control of these examinations in two different laboratories corroborate this result, which we observed for months, as a remarkable symptom of tertiana relapses. Inversely, a negative Wassermann reaction in cases of a primary infection, permits the prediction of relapses. We periodically follow up the course of each malaria admission. First of all the following questions arose:

Is this obvious anergy due to constitutional factors? Does it partly disappear with the end of malaria and is this due to the growing protection of the organism or to the weakening of the parasite strain? How does the Wassermann reaction act during the incubation period, that is to say during the latent period? Examinations in connection with a suitable follow-up control on a large scale would probably throw light on this matter if made in the Spring when the tertiana epidemic rages. Do the specific malaria drugs destroy the specific antigens in some of the relapsing patients? How would it be possible to break or modify the assumed anergy?

We have examined the similarly mentioned question concerning the incompatibility of plasmochin and atabrine administered simultaneously for quite a long time. I feel sure that plasmochin and atabrine can very well be administered for 5 consecutive days without any trouble worth mentioning, if a certain care is observed.

Two new ideas regarding the reduction of the curative treatment of malaria and the use of new remedies for the treatment of amebic dysentery were briefly discussed.

The malaria curative treatment with quinine took about 6 weeks in World War I. The plasmochin-atabrine standard cure now in use requires 10 - 12 days. Such a considerable reduction of the period of treatment with the same effect and good tolerability will without doubt be highly welcome to the Armed Forces, and given preference over the older method of treatment. At least we have discovered a 5 day cure, which seems to fulfil the necessary requirements. The chosen schizont-compound is administered concurrently with plasmochin and may be given for 5 consecutive days, with a somewhat larger dose on the first and second day. So far this method has been used on 160 malaria infected patients as well as on patients for prophylactic purposes and the result has been satisfactory. The advantages are so apparent that this kind of treatment has been recommended as the method of choice. Nothing can be said as yet regarding the percentage of relapses. At present this first test serves as a basis for the recommended simultaneous 5 day atabrine-plasmochin treatment. Instead of using Yatren, a preparation which is very scarce, we have examined the Wismut-Arsenic-acid preparation of I.G. Farben (9659a), which was given against amebic dysentery with the following briefly described result: Excellent compatability, no symptoms of intoxication, in no case acting as a laxative, on the contrary having a constipating effect. So far, at least the same healing effect as with Yatren was obtained in the infections of the lumen of the intestines and also in ambulatory treatment. Two courses are advisable in order to be sure of the result, finally two tablets must be given three times a day for the following 7 days. No effect has been observed on the active dysenteric amoebae or on clinical amebic dysentery. So far 60 cases were checked up, including an examination of the stool on 20 - 25 different days in each case. This remedy seems to be suitable for treatment of an infection of the lumen of the intestines as well as for prophylactic purposes. The preparation can so far be produced only in laboratories on a small scale. Mass-production will not be possible very soon.

The roughly described test-results will be published. An examination concerning the matter is herewith suggested.

5. Relationship between topography and malaria in Greece.

Stabsarzt (Captain, MC.) Prof. HABS

The conditions concerning malaria in a given country are partly due to its climate and partly to the formation of the soil. Greece can be characterized as a country with a conglomerated geological formation, called detritus. This favored the formation of table shaped basins, which often hardly allow the water to drain off. In the lake and swampy districts the conditions favor the breeding of the Anopheles maculipennis. Irrigation works and artificial drainage afford additional breeding places. The masses of rain falling in a short period of the year cause extensive erosion in the upper course of the brooks and rivers and huge deposits in the lower course. Due to the reciprocal play of forces of land and sea, the most different geological formations come into existence in the delta region, such as dams and lagoons, which are favorable breeding places for Anopheles elutus, which are particularly fond of brackish water. If small troughs are cut in the dry river beds of the upper courses, which are often deeply excavated, the breeding of Anopheles superpietus can also be developed in running water. There are three different groups of malaria infected areas according to the different character of the country. Most mosquitoes exhibit a preference for a certain type of breeding place such as swamps, brackish water and river beds. For instance in the plain of the river Wardar it is shown how the different geological factors contribute to develop serious malaria infection in this district.

6. Malaria in South Russia.

SS-Standartenfuehrer (Colonel, Elite Guard) Dozent MRUGOWSKY

1. General spread.

Malaria is endemic in the river valley of the Ukraine, the Don and Wolga-plain and in the Caucasus. Especially in the years of famine and civil war, namely in 1921 - 23 and 1934 - 35 malaria increased extraordinarily.

Today malaria occurs mainly in swampy districts of the river Bug, Dnieper, Inguel, Unguletz, Don, Donez and Volga, in hilly districts of the Crimea, along the coasts and in the lowlands of the Caucasus. The highest number of malaria cases were reported in Azerbeidjan, Armenia and Grusinia.

The distribution in the different periods shows that the curve of malaria generally reaches only one peak, although curves with two peaks have been observed. A rapid change has to be expected in the South of Russia in connection with the total cases of all diseases in regard to their usual forms.

2.   Plasmodia.

Tertian malaria is the most frequent infection. 18 -
29 per cent Plasmodium falci parum and 30 - 45 per cent
Plasmodium malariae were found in Armenia in 1938. The
number of tropica cases in Grusinia and in the Ukraine are
reported to be on the decrease.

The Soviet physicians are extremely unqualified to
diagnose malaria cases either clinically or microscopically.
Only 17.2 per cent of the cases, clinically diagnosed as
malaria, could be proven microscopically by Dr. WINNING in
Chersson in June 1942. In mass-examinations carried out in
the streets of Chersson, the number of cases, which were
found positive, varied between 5 - 15 per cent. The "spleen
index" proved to be impractical...

3.   Anopheles.

Anopheles maculipennis is the main transmitter of
malaria in the Ukraine, especially the type of messea and
atroparvus.

Anopheles bifurcalus lives everywhere, but prefers
walls and cisterns.

Anopheles hyrcanus in the river plains of the Dnieper.

Anopheles plumbeus is of no epidemological importance.

Anopheles superpictus is found in the mountains and is
the main transmitter of malaria in Azerbeidjan.

Anopheles hyrcanus var. pseudopticus is the main trans-
mitter of malaria in Western Grusinia.

4.   Breeding places.

The main reason for the spreading of malaria in the
Ukraine is the entirely uncontrolled rivers, which flood
the districts continuously. Especially in the area of the
bends of the rivers, extensive swampy districts spread
over the country. I was able to prove larvae in the
especially large swampy districts south of Saporosche even
in June of this year. The whole area must be considered as
a large breeding district of Anopheles. The breeding places
are not restricted to some pools. Old branches of the river
with stagnant water from the floods of the last spring
serve as excellent breeding places.

Another breeding place of mosquitoes transmitting
malaria are the extensions of river valleys along the coast
(formation of deltas). As an example, we mention the
Molotschnoje-delta in the South of Melitopol, which offers
an ideal breeding place for Anopheles due to its swampy
edges.

Most breeding places in the <u>Crimea</u> are found in the
fresh water swamps along the coast. The water oozing out
of irrigation canals and reservoirs (Crimea, Azerbeidjan,
Grusinia) forming numerous flat pools play a decisive part.

The rivers without any fall form a swampy alluvial
land in Grusinia, the formation of which is further favored
by the high level of the sub-soil water. These water re-
servoirs are marvelous breeding places for mosquitoes.

The rice fields in South Russia are important breeding
places for Anopheles. These places are flat and quickly
become warm if continuously watered. No good results were
observed in cases of a spraying.

7. Control of Anopheles larva by aircraft.

Oberfeldarzt (Lt. Col., MC.) Prof. ROSE

In only two places of the Command of the German Air-
force have aircraft (of the administration for the pro-
tection of forests) been used for spraying the chemical
agents for combatting larvae. The results were satisfactory
but the craft and equipment had to be changed considerably
in their construction for this purpose.

The possibilities of using aircraft for combatting
larvae have often been overestimated. Examinations showed
only exceptionally that large sheets of water serve as
breeding places and are suitable for treatment from air-
planes. Aircraft should never be used for such purposes
without sufficient entomological ground organization.

Discussion:

MENK: Shares ROSE's hesitation to use highly in-
creased atabrine doses as occasionally administered by
MEYTHALER. Even in severe tropica cases the usual dose
of atabrine was injected intramuscularly and sometimes
together with quinine injections (MUEHLENS). In mild
malaria cases a combined treatment lasting 5 - 7 days
is recommended (1 tablet of atabrine 0.1 gram and plas-
mochin 0.005 grams three times a day) and is usually
well tolerated. If this type of treatment causes any
trouble, it is advisable to use pure atabrine. The new
type of treatment mentioned by HAUER is quite promising.

RODENWALDT: I would like to express only one wish
in this matter. The report of ROSE concerning prophylaxis
and therapy in case of malaria will be confirmed by every
physician, who has followed the development of the thera-
peutic aspects of malaria during the last 20 - 30 years.
In this decade, it became clear that any increase of the
dosage and any prolongation of treatment are steps in the
wrong direction. On the contrary the general trend is to

decrease the doses and to reduce the time of treatment.
Our internists were not well enough acquainted with malaria
in these two years of the war. They were definitely under
the impression that relapses occur very frequently and therefore
they have striven for a prevention of relapses by an in-
crease of the dosage and prolongation of treatment, which is
understandable from the viewpoint of medical ethics. But
malaria is in any case a disease which has relapses. We can-
not help it, as long as we do not have a therapia magna
sterilisans for malaria. I address the urgent request to
the internists here present, especially to the consulting
internists, not to change the treatment in the future, this
will only be useless.

SCHULEMANN: By the well tolerated combination of 0.05
gram atabrine and 0.005 gram plasmochin administered once
a day, it seems possible to obtain a stronger effect in
latent malaria as shown by daily parasite examinations than
by a dose of 0.05 - 0.1 gram atabrine and 0.005 gram plas-
mochin given separately once a day.

A careful examination of the prophylactic effect of the
combination is recommended.

MARTINI: Geographical distribution of malaria and
its influence on tactics and strategy.

HOERING: A report concerning serious malaria infection
in soldiers of two railway engineer units revealed that 50
per cent of the soldiers were infected, 80 per cent of whom
have suffered from relapses, on the average 3.5 times per
patient and some men as many as 12 times. Probably each
man was repeatedly bitten by mosquitoes. As malaria does
not produce immunity in general, the soldiers may be in-
fected not only with one but with many tertiana at the
same time. The remedies act only on the breeds in the
fever-producing stage, but not in the latent period, there-
fore many relapses occur when patients are infected several
times. This explains the inefficiency of a treatment with
larger doses of atabrine and plasmochin and the "final
treatment" with regard to the relapses. The only effect
is that the atabrine prophylaxis will be prolonged for some
weeks.

Directive on the control and treatment of malaria.

The booklet "Malaria", annex 2, Army Manual 1a, is
still in force with the following supplement, which must
be considered as a general instruction to medical officers.

1. The medical officer of the troop has to inform
the commander of a formation of the importance of malaria
prophylaxis with regard to the combat efficiency of the
troops and of the effect to be expected from prophylaxis.
Besides, the commander of a formation has to be informed
that atabrine prophylaxis is innocuous and that the yellow
discoloration of the skin is of no importance to the health
of the patient. If prophylaxis is not used for the troops,
their combat efficiency is jeopardized. The employment of
prophylaxis is incumbent to military command and not the
medical service.

The well known fact that prophylaxis does not afford
a 100 per cent protection from malaria is not synonymous with
the failure of prophylaxis. A temporary increase of the
prophylactic dose from 0.06 to 0.1 gram atabrine has to
be requested through the Chief Surgeon of the Army in case
of special hazard. A special hazard prevails if more than
2 per cent of the individuals of the exposed units of the
troops are infected in spite of the employed prophylaxis.

2.   The Chief Surgeon has to insist on the observation
of mechanical protection against mosquitoes and on adequate
measures to destroy the breeding places, as described in the
booklet "Malaria". He further has to insist on being con-
sulted about the choice of the billets for troops and that
his opinion be taken into consideration.

3.   The instructions concerning therapy given in the
booklet "Malaria" should be adhered to in every case. All
experiences made on malaria therapy for the last 30 years
have shown that the reduction of relapses cannot be forced
by an increase of the dosage or by the prolongation of
treatment. Atabrine and quinine should not be injected
parenterally in case of malaria tertiana. During the war,
a much higher percentage of relapses must be expected due
to a variety of circumstances.

V.

BACILLARY AND
AMEBIC DYSENTERY

Translation prepared by:

Office of Military Government for Germany (U. S..)
Office of Naval Advisor
Medical Section

A.   Bacillary Dysentery.

1.   Bacillary dysentery. 1942.

Oberarzt (1st Lieut., MC.) Prof. SYLLA

As far as the number of cases is concerned, dysentery did not play an important part in the middle of the Eastern Front this year. Fortunately there were only very few cases as compared with the summer of 1941. The non-specific diarrhea occurred also more rarely this year. Bacteriologically all cases were exclusively diagnosed as FLEXNER dysentery. KRUSE-SHIGA dysentery was observed 3 times in one army and a smaller group was infected by SCHMITZ's bacilli (11 men).

The clinical progress of diseases did not show any peculiarity this year. The patients who remained with the medical service in the front lines recovered quicker than those, who were evacuated to the rear. Patients suffering seriously from the long-lasting diseases were hospitalized in military hospitals behind the lines. The well known complications occurred here too, such as rheumatoid, conjunctivitis, urethritis, and REITER's fully developed triad, but were no more prevalent than last year. The duration of the disease was largely dependent on the complications. The tendency to relapses and chronic irritation of the large intestine was about the same as the previous year. Slight diarrhea, which lasted for weeks, was not cured with the usual treatment, but good results were obtained by treating the gastric anacidity.

The statistics of the Army reveal that the mortality rate is higher than last year. The ambulatory cases of dysentery, however, are not taken into consideration; probably many cases of "gastric" dysentery were not reported. The error due to the low number of cases under report will certainly affect the comparability of the figures. The immunization had no favorable influence on the mortality in dysentery. None of the three mentioned patients suffering from KRUSE-SHIGA dysentery died.

No particular news can be reported concerning the general treatment of dysentery. It is important to stay in bed, to keep warm and to observe a strict diet. To be without any food or drink for 1 - 2 days is quite favorable. Intravenous or intramuscular infusions are used against dehydration. Experience has repeatedly shown that massive doses of sulfonamides may reduce the infection when used at the very beginning of the disease. Cibacol and eleudron are recommended, because of their slight side-effects on the stomach. These remedies cause constipation. The following doses have proved satisfactory: 6 grams on the first day, 5, 4, 3, 2, 1 grams on the following days. Castor-oil should not be administered in this treatment. The bacteriophage treatment has only been used in single cases and without any remarkable success. In some highly toxic cases serum has been inoculated. A certain detoxication was recognized occasionally. Blood transfusions from healthy persons are also effective.

The question, whether the low incidence is due to
the immunization against dysentery, is certainly of great
interest. It is impossible to answer this because no com-
parisons are available. Our Army has waged a positional
war. The hygienic conditions were comparatively much
better organized than last year. The flea-nuisance was
considerably reduced because of the cold spring and cold
early summer. The patients could be isolated without
great difficulties.

The soldiers were not all vaccinated. Our statistics
do not reveal whether unvaccinated soldiers are more fre-
quently or more seriously infected. Even the mortality
is not influenced by the vaccinations. The following ob-
servations have been made in connection with the tolerance
of the serum injections, when using Behring-serum. The
severe reactions and abscesses etc. followed by the in-
jections with Aldystox (BASTEN) last year, occurred only
in single cases this year. If after the first injection
patients suffered from diarrhea, further injections had
to be stopped. About 20 per cent of such severe reactions
caused by injection were reported by certain medical
officers. A serious anaphylactic shock occurred once, but
the patient did not lose his life. Abscesses caused by
injections were only observed in single cases. Some single
cases exhibited a mixed infection which probably was due to
the inoculation of germs. From the surgical point of view
(STARLINGER) perforation of ulcers of the stomach and duodenum
are common after injection. Six soldiers had to be operated
because of such perforations.

2.   Dysentery.

Oberarzt (1st Lieut., MC.) Dozent WALTER

Post mortem examinations were made on 20 bodies whose
death was caused by dysentery; the water and chloride content
of the skin, of the periosteal adipose tissue, of the muscu-
lature and of the liver was determined, in order to explain
the phenomenon of dehydration. The result was as follows:
The water content of the skin was on the average 60 per
cent in contrast to a norm of about 70 per cent. The
lowest values were less than 40 per cent. The value in
the periosteal adipose tissue has been found up to 9 and 14
per cent, the norm being 26 to 30 per cent. If the fat
content of the periosteal tissue is very poor, its water
content is considerably higher, but in most cases below
the norm. The musculature and inner organs, such as liver
and kidney, are not affected by the loss of water. The
loss of chloride is even more striking. The skin revealed
a value of 200 down to 120 milligrams per cent instead of
300 milligrams per cent of chloride. The periosteal adipose
tissue exhibits a similar loss and the musculature had a
lower chloride content on several examinations. Therefore
it is necessary to supply patients who are seriously ill

with a large dose of sodium chloride, as the loss of chloride
is due to urine, stool and sometimes vomiting and cannot be
balanced by their usual diet containing only 1 - 2 grams of
chloride daily.

One of the new sulfonamide preparations "Globucid" has
shown good results. The effect is similar to that of "Eleu-
dron" and "Eubasin" and was considerably superior to bacterio-
phages. The tolerability of this remedy was good.

The morbidity rate distinctly decreased by use of
bacteriophages as could be proved in more than 20,000 cases
according to the findings of last year and which is con-
firmed by the observations derived from Russian sources.
There is no need to discuss this fact, as phages cannot
be used in the Army for prophylactic purposes on a large
scale.

The increase of residual nitrogen in dysentery is chief-
ly due to an increase in urea. Only very seldom could an
increase in residual nitrogen be observed, a fact which must
be related to a disturbance of the liver. The difference
"N" (difference between nonprotein-nitrogen and residual N)
normally amounts to 6 - 10 milligrams per cent. In case
of dysentery this difference N is frequently increased and
in some single cases is as high as 60 milligrams per cent,
and will decrease quickly again during convalescence. The
difference of nitrogen is sometimes increased, even if there
is no increase of residual nitrogen. The difference "N" is
obviously closely related to the increased decay of protein.

A disturbance of the third phase of coagulation, the
retraction of fibrin, is observed not only in severe cases
but also in mild cases of dysentery and other infectious
diseases. The definition of the number of thrombocytes,
thrombocyte-agglutination and addition of thrombokinase
and normal thrombocytes revealed that this phenomenon does
not depend on thrombocytes and thrombokinase but is pro-
bably due to a toxic damage of fibrinogen.

3.   The pathogenesis of dysentery.

Oberstabsarzt (Major, MC.) Prof. BOEHMIG

The etiology of dysentery is well known. The patho-
genesis, however, is not quite clear. No other intestinal
infections start pathologico-anatomically in the rectum.
The specific changes are limited to the intestine and the
non-specific changes to the regional lymph-nodes. The
blood vessels and other organs remain free from germs and
appreciable reactions, except for a strong alternating
leucocytosis in rare toxic involvement of the joints and
neuritis. Thus dysentery stands outside the group of
typhoid diseases which permit the proof of at least one
bacillus in the blood, even with the toxic forms of para-
typhoid, without showing severe changes of the mucous mem-

brane in the intestine. Neither clinical observations nor
bacteriology nor pathology have been able to clarify the
peculiar course of dysentery. It seems as if the interest
in a pathogenetic clarification has become generally very
slight. Therefore, it will be my task to contribute to
the pathogenesis based on macroscopic and microscopic autopsy
findings during the campaign in Russia.

LOEHLEIN writes as follows about his observations made
during World War I: "Today it should be generally recognized
that each case of dysentery starts as catarrhal dysentery."
ASCHOFF describes the bran-like coat as the earliest change.
WESTENHOEFER has the opinion that the disease starts in
the follicles and that the catarrh is not a primary but an
attendant symptom. BEITZKE and HART have observed early
fatal cases characterized by diffuse gastro-intestinal
catarrh and atypical ulcer.or by purely toxic disturbance
of metabolism. The reason for this controversy is due to
the fact that the pathologist very rarely sees a genuine
early stage of dysentery, apart from merely incidental
findings, as for instance in case of death subsequent to
gunshot injury if the individuals happen to suffer from
dysentery at the same time.

We must consider the clinical conditions first and
have then to examine the symptoms of dysentery. In this
case not the secretion of mucus but the ordinary diarrhea
has to be mentioned which can not be differentiated from a
dyspeptic or alimentary diarrhea or a diarrhea due to chill-
ing which occurs rarely with alkali but usually with acid
fermenting stools and shows unreduced bile pigment. The
diarrhea which is due to a catarrh of the mucous membrane
behaves as any catarrhal inflammation in other organs:
1. non specific and 2. associated with watery secretion.
I doubt whether the respective mucous membrane is really
infected in a "catarrhal disease of the mucous membrane".
The proof is still to be furnished concerning this fact.
In the first stage of a catarrh of the mucous membrane no
change of the glands are found microscopically but an
enormous dilatation of the capillaries in the mucous mem-
brane is observed which causes the watery secretion. Chill-
ing, as well as every alimentary disturbance or chemically
injurious agent, may produce such reversible capillary-
ectasia according to the individual sensitivity. As the
second stage an interstitial increase of cells between the
glands of the mucous membrane follows which then causes
an increase of the mucous secretion.

Does this also apply to dysentery? Diarrhea as the
first symptom is evidence of a decrease in the resorption
capacity for food, as well as a symptom of watery extra-
vasation in case of capillary-ectasia. Whether the latter
process is the only manifestation of a toxic effect of
dysentery-bacilli already active, or whether toxin is
secreted through the blood vessels into the large intestine
(as LETTERER has stated according to the experiment on ani-
mals made by DOERR) has not yet been established. Practical
experience has shown that dysentery was always associated
with a cooling off or to imperfect nutrition, the enteric

or colitic symptoms of which may either subside or lead
to acute dysentery. Earlier in the course of dysentery
we observe a diffuse infiltration of cells between the
glands of the large intestine as the only microscopic
change. This same change affects the entire large intestine
or meter-long parts of it. The same type of change has
been observed in patients suffering from gunshot injuries
without any infectious dysentery where the patients had
been chilled during evacuation last winter and resulted in
diarrhea. The finding of the mucous membrane is therefore
non-specific and no diagnostic symptoms of dysentery could
be observed. It is not a mere dialectic controversy if we
assert that dysentery does not start with a "catarrhal in-
flammation" as LOEHLEIN has already asserted, but is pre-
ceded by a non-specific catarrh of the mucous membrane.
Is this observation very important? I think so, because
of the problem of culture of dysentery-bacilli. It has often
been proven that dysentery bacilli are destroyed by the
gastric juice (even within a few minutes). Theoretically
bacilli may reach the intestine alive only in case of an
insufficient secretion in the stomach or by anacidity.
The question arises whether the toxins become free in the
stomach or if they cause a hinderance or even a neutraliza-
tion of the gastric secretion. This point is emphasized
by findings of sloughing inflammations of the mucous mem-
brane in the stomach with a positive finding of bacilli,
which we occasionally established on Russians. Perhaps
variable acidity values explain the individual differences
in a dysentery epidemic: perhaps the clinicians are in-
terested in this question. The first invasion of bacilli
occurs in the rectum. Here we always find the first
"specific" anatomical sign in the form of a bran-like coat.
How does this localization in the rectum take place? If
there was a normal function of the intestine or even an
obstipation, it would be possible to think of an accumulation
of bacilli within this part of the intestine. But on the
contrary, enteritis, or colitis always precedes and causes
a quick emptying of the intestine and watery secretion which
makes any adhesion of bacilli on the intestinal mucous mem-
brane impossible. Therefore only two factors explain the
onset of dysentery in the rectum, 1. the slight or totally
absent resorption capacity and probably the decreased
secretion capacity of the mucous membrane of the embryonic
rectum in comparison with other parts of the intestine;
2. intestinal spasm and defects of the mucous membrane.
The intestinal spasms keep the stool in the rectum, sigmoid
and in the descending colon. These facilitate the adhesion
of dysentery-bacilli in places where the loss of epithelium
is microscopically visible leaving the basal membrane ex-
posed. The spasms must be the cause of the gradually retro-
grade progress of the specific changes of the mucous mem-
brane up to the cecum or because of insufficiency of the
BAUHIN's valve up to the small intestine.

The specific changes of the mucous membrane show
microscopically a typical inflammatory reaction (fibrin),
toxic effect (necrosis) and non-specific chronic ulcerous
inflammation. In the first stage, the inflammation is
limited to the mucosa. The second stage of necrosis is

also limited to the mucous membrane; the toxic effect being
recognized by the remarkable absence of reaction in the
epithelium and connective tissues, furthermore by the re-
newed lake-like distention of the capillaries, by the ab-
sence of exudate cells or by the formation of a thrombus,
and by the late onset of a well defined inflammation in
the submucosa. The third stage begins preferably in the
lymph nodes of the intestine. Here we observe physiological
interruption of the muscularis mucosae, so that after the
necrosis and discharge of the lymph nodes, the infection
located in the follicle bed may advance and spread in all
directions in the submucosa. According to our microscopical
findings the toxic effect of dysentery bacilli is limited
to the necrosis of the mucous membrane and the intestinal
lymph nodes. The subsequent ulceration is non-specific.
It is believed that it is maintained by dysentery bacilli,
but this has not yet been proven. Pseudo-membranes or fresh
necrosis are missing in all larger or older ulcerations,
that is to say all characteristic changes of tissue in
dysentery. It is remarkable how early the regeneration
of the exuberantly growing mucous membrane starts in the
newly formed flandular epithelium in the lymph nodes and
to what extent such regeneration of mucous membrane spreads
parallel to the surface below the muscularis mucosae, in
the submucosa, and into the recesses of the undermining
ulcers. Most of the regenerated tissue is destroyed by
non-specific inflammation.

After discussing the microscopic changes in the in-
testine we return to the details concerning dysentery:
the finding of bacilli is limited to the intestine and
the regional lymph nodes. A bacillemia does not occur,
an essential toxemia can generally not be expected, be-
cause in that case circulation and the blood picture would
appear differently and the regional lymph nodes would show
characteristic changes. The only specific effect of
dysentery bacillus - after a non-specific earlier involve-
ment of the mucous membrane of the large intestine - is the
sloughing inflammatory reaction, the necrosis as a toxic
effect. The causative agent which maintains the non-
specific ulcer extending along the surface remains doubt-
ful. The formation and resorption of endotoxin must be in-
comparably less important than in diphtheria. This is
perhaps due to the presence of numerous bacteriophages.
Only the rare cases of early death in dysentery are due to
the toxic effect and must be considered as a toxic vasomotor
paralysis. The late death which occurs more frequently,
is considered to be a death of exhaustion, not due to
a direct toxic effect but to the loss of mucous membrane
in the large intestine.

These facts will indicate that the problem in dysentery
is the pathogenesis. This problem cannot be cleared up
from the pathologico-anatomical aspect. We should like
to urge the clinicians to go deeper into this matter.

Remark: The divergent opinions of some of the patho-
logists present could not be discussed after the lecture
of BOEHMIG due to the lack of time (LAUCHE).

Discussion:

LAU: No specific differences between immunized and non-immunized patients could be observed with regard to morbidity and severity of the disease in cases of dysentery in a local military hospital in the summer of 1942.

GUTZEIT: I am familiar with the conditions of dysentery in several Eastern Armies. Generally speaking the course of dysentery was less severe and fatalities were less numerous this year. On the whole, FLEXNER-dysentery was more frequent and there were only a few cases of SHIGA-KRUSE dysentery. The severity of the disease increases with the distance behind the front line due to evacuation problems. The course and severity of FLEXNER dysentery was not influenced by the type of vaccination. Whether Behring or Zeiss-serum or Aldytox had been used, the result was always the same. One part of the unit was vaccinated with Zeiss-serum, another part with Otten-vaccine (only SHIGA vaccine) and Dysperos (a combined vaccine, administered by mouth), a third part of the unit only with SHIGA vaccine, and a fourth part of the unit was not vaccinated at all, due to difficulties of supply. In all these different instances, dysentery was manifested only by mild symptoms. As a matter of fact not all the requested reports have come to hand so far, and in my opinion, we will have to procede with the utmost reserve in the evaluation of immunization successes in the case of FLEXNER dysentery.

BICKERT: It has not been clarified what accounts for the small number of cases and the mild symptoms in the course of dysentery in 1942. Dysentery occurred only in soldiers who had not been immunized among troops of the field reinforcement division while the immunized soldiers were protected. In cannot be said without further investigation that immunization against dysentery is worthless.

RODENWALDT: It has never positively been reported that the immunization is effective against FLEXNER dysentery but it is effective against SHIGA dysentery. On the whole, SHIGA-dysentery occurred very rarely and did not play an important part in 1939/40. But I would like to refer to the fact that a SHIGA epidemic was spread by a patient in Kaiserslautern who returned from the Eastern Front, and which caused many fatal cases. This was a SHIGA epidemic imported from the East. The question arises if the immunization has been effective against SHIGA dysentery.

Directives:

(Amendments of the circular concerning dysentery).

1. Eubasinum, respectively Eleudron must be mentioned first for the therapy.

2. Bacillary dysentery should not be treated with Rivanol tablets.

3.   Laxatives (castor oil, calomel) will be administered only in the incipient stage of the disease. If the patient is transported to another hospital no other laxatives should be prescribed.

4.   Treatment with hydrochloric acid should not be forgotten in cases of chronic dysentery and chronic disturbance of the intestine following dysentery. (Hydrochloric acid, non dilutum 20, distilled water ad 200, one tablespoonful in a glass of water). But since the supply of large quantities of liquid is very difficult, it is better to take hydrochloric acid tablets such as were delivered to the Africa-Corps by the main medical depot.

B.   Amebic Dysentery.

1.   Experiences with amebiasis in Lybia.

Stabsarzt (Captain, MC.) Prof. HORSTER

While amebic dysentery is the most widespread disease (TABARELLI) in peace time in Lybia, bacillary dysentery has never caused an epidemic; but during the war it was just the other way around. Amebic dysentery is usually manifested secondarily as a complication of a gastro-intestinal disease, especially following bacillary dysentery. While the latter is diagnosed by its clinical symptoms and the proof of the bacilli is not essential for our point of view, the proof of amebae is absolutely necessary, however, for the treatment of amebic dysentery.

In the many cases of gastric disturbance the carrier of amebae can only be discovered by a careful microscopic examination of the stool. A stool resembling raspberry jelly is only rarely a positive indication of this disease. The diagnosis of amebiasis is in the first place a problem of systematic stool examination. As with almost all patients suffering from gastro-intestinal disturbance and frequent passage of stool, a repeated examination of the stool is necessary (saline cathartics after provocation). Therefore we have trained suitable soldiers for the troops and for the hospitals so they are able to examine the stool (students and other indigenous persons in laboratories). The result was that about 25 per cent of the soldiers suffering from intestinal disturbances and being treated in military hospitals were found to be harboring dysentery amebae. We looked thoroughly into this matter when the stool of patients was regularly examined by WESTPHAL, his staff and well-trained personnel in all military hospitals. The investigation was completed by monthly reports of all cases of dysentery including the diagnosed forms of the disease.

These reports showed that the findings correspond to those of the Autumn 1941 and that in May as well as in July 1942 approximately 25 per cent of all patients suffering from intestinal disturbance, which have been treated in military hospitals, were infected by amebic dysentery. Most of them suffered only from infection of the lumen with cysts and small forms. Genuine amebic dysentery occurred very rarely. These conditions compel us to examine each patient suffering from intestinal disturbance for amebic infection, regardless of whether the diagnosis of bacillary dysentery, enteritis or another type has been established or not. This observation is of special practical importance because amebic dysentery is likely to be superimposed in case of complex intestinal diseases and especially in the case of bacillary dysentery (lantern-slides showing two temperature curves).

Only three weeks after the onset of acute bacillary dysentery tissue structures of Endamoeba histolytica are observed in the stool. These observations fall in line with the course of the experiment carried through on himself and demonstrated by WESTPHAL in which case a histolytica infection was active for 8 months. This infection developed into an acute amebic dysentery with numerous vegetative tissue structures 23 days following a secondary infection with pathogenic intestinal bacteria.

But conditions are not always that clear, as tissue structures may be observed even in the first acute days of bacillary dysentery, even without prior intestinal disturbances being included in the anamnesis. The clinical aspect of bacillary dysentery does not change by this double-infection. It is possible that small amebic forms develop rapidly into large forms in the mucous membrane of the intestines and in the necrotic tissue which have been damaged by toxins of bacillus dysenteriae. Thus they can be found in the stool without a genuine infection of the intestinal wall. But even in these cases only the acute bacillary dysentery is the reason for discovering the amebiasis. A thorough drenching by rain or immersion or extensive consumption of alcohol may lead to an acute onset of enteritis in which amebae (tissue structure) may be observed. The anamnesis of intestinal trouble among these patients goes back over many months, and is characteristic for a chronic subacidity respectively anacid gastro-enteritis, as was frequently observed in troops stationed in North-Africa. In such cases dyspepsia coexists with latent amebic infection and it is not possible to indicate the onset of amebiasis. Outside influences lead to severe acute clinical symptoms. But it would certainly be wrong to diagnose an acute amebic dysentery in these cases.

Patients also developed amebic dysentery almost under our very eyes. Pfc. E.D., 20 years of age, had been hospitalized since the end of October 1941, because of diphtheria. No symptoms indicated gastro-intestinal disturbances, The stool was perfectly normal. During the period of convalescence a frequent passage of stool containing blood and

mucus as well as many tissue structures without any associate
fever was observed on 29 November. Probably the general, and
especially the local, disposition of the intestines were so
much changed by the diphtheria that a latent amebic infection
(cysts and small forms) could develop into a clear cut amebic
dysentery. In another case an amebic infection was only dis-
covered after extensive abscess formation in the liver.
Emetine had a favorable effect on patients suffering from
abscess of the liver. Important clinical symptoms are the
following: large liver, sensitive to pressure; clearly
visible in X-ray examination, high temperature, leucocytosis,
and the stool sometimes containing Endameba hystolytica. Th
immediate effect of Emetine supports the diagnosis. Other
complications due to amebic infection were not observed.

Treatment: Patients suffering from intestinal dis-
turbances with tissue structure in the stools should be ad-
mitted to the hospital and kept at rest. The same refers
to the majority of patients suffering from intestinal dis-
turbances with small forms when observed in the beginning
stage. The general treatment (basic therapy) corresponds
to the one used in bacillary dysentery such as cathartics,
heat and at first a tea and porridge diet, after that the
patients soon need a diet which consists of food rich in
calories and vitamines, and it has further to be full of
variety and easy to digest. The "specific" treatment of
amebiasis is usually not very urgent. In most cases in which
bacillary infection is predominant, a Eubasin or Eleudron-
therapy (2 tablets five times a day for 2 - 3 days) should
begin the treatment for amebiasis. Further Acidolpepsin
should be given regularly even after the disease begins to
subside.

Emetine is the basis of an energetic chemotherapy in
all cases of tissue infections. The following doses are
recommended: Patients with a strong constitution need 0.06
gram intravenously once a day, other patients need 0.03 gram
twice a day. The total dosage is 0.6 to 1.0 gram. On
principle we combine Emetine treatment with an oral and also
a rectal treatment with Yatren. In strong patients with new
infections without a long lasting preceding intestinal dis-
turbance, the diarrhea as well as the endamebae disappeared
after a few days, while the result of the treatment was not
very satisfactory in patients suffering from chronic intes-
tinal disturbances.

Yatren appears to have an unpleasant effect in the
beginning on most of the patients when administered in
large doses. Diarrhea and tenesmus increase. Rivanol has
a comforting action due to its spasmolytic effect. We have
come to the point that we no longer use Rivanol exclusively,
for we have frequently seen an amebic dysentery developing
in patients who were treated with Rivanolettes because of
bacillary dysentery. All patients suffering from intestinal
disturbances and in which cases an amebic infection has also
been recognized, were given an intensive chemotherapeutic
treatment, even if it might only be a lumen infection with
cysts and small forms. It may easily happen that a true
tissue infection occurs in the injured intestines. The clear

cut lumen infection has been treated orally and rectally with
Yatren but without Emetine. The majority of the patients
suffering from intestinal disturbances with a histolytica
infection had to be evacuated. Those patients have not
much chance of recovery under war conditions in the North
African climate. Healthy carriers of cysts do not require
any treatment.

Prophylactic treatments are based on the same pro-
cedures as used for bacillary dysentery. It is important
to prevent and to combat the frequent dyspepsia and anacidity
and subacidity by the use of hydrochloric acid. It is nec-
essary to supply the patient with a suitable and nourishing
diet which does not upset the intestine during the hot
weather (further information given in the field cookery
book for hot countries). Chemoprophylaxis by using Yatren
or Rivanol did not show satisfactory results.

Summary.

1.   The most important thing in combatting amebic
dysentery is a reliable system for the examination of
the stool.

2.   Combatting infectious and non-infectious gastro-in-
testinal diseases is the most effective prophylaxis
which may be used in the control of amebic-dysentery.

3.   The best specific therapy used for tissue infection
with dysentery amebae consists at the present time of
the use of a combined Emetine-Yatren cure.

4.   A clear cut lumen infection should not be treated
with Emetin.

5.   Individuals, in whom only cysts or small forms
have been found, have to be treated only if the danger
of a subsequent development of a tissue infection ex-
ists because of an additional disease, particularly
an additional intestinal disease.

2.   Parasitology of amebic dysentery.

Sonderfuehrer (Special Consultant) WESTPHAL

In the beginning of this report reference was made to
the discovery of the amebae causing dysentery, the Endamebae
histolytica, in 1875, when for the first time the cause of
this disease could be proved. Around the turn of the century
the dysentery bacilli were discovered. Amebic dysentery and
bacillary dysentery have been treated separately ever since.
In addition to the patients suffering from amebic dysentery
properly speaking, we have to deal with the "carriers" of dys-
entery amebae which are practically free from symptoms, espe-
cially in the tropics and subtropical districts. The propaga-
tion of Endameba histolytica as small forms in the intestinal

lumen and occasional cyst-formation of the small form in
the intestinal lumen and the occasional development of
the large form on invasion of the intestinal wall are
demonstrated by means of a chart of the schematic cycle.
This invasion into the intestinal wall and thereby the
development of the real amebic dysentery is due to a lowered
resistance of the intestinal wall, especially owing to
bacillary intestinal injuries. Today, amebic dysentery and
bacillary dysentery must not be treated separately because
of their common pathogenesis. In a series of histological
sections of an infected cat's intestine, different chaning
effects of the preceding bacillary dysentery and the follow-
ing amebic dysentery are demonstrated. The spreading
bacillary injury of the tissue is followed by a burrowing
invasion of the healthy tissue by the amebae. The muscularis
mucosae will not be passed by amebae. The toxic bacillary
irritation causes a swelling of the submucosal lymph follicl,
from which the invasion of the muscularis mucosa and of the
mucosa itself begins. Amebae are likely to invade the ad-
joining submucosa from these prepared positions and then
produce the typical amebic ulcers. The vascular system can
be exposed in the mucosa without causing any considerable
intestinal injuries. This process leads to the formation
of abscesses of the internal organs, especially of the
liver, apart from a marked amebic dysentery. These con-
ditions, microphotographically demonstrated, compel us to
take great care in amebic dysentery as well as in ordinary
intestinal lumen infection with amebae causing dysentery
which may infect combat troops in hot climates. Therefore
a thorough training of the personnel in laboratories is
necessary which will be supervised by the hygienists of
the Army, and will be assisted by the consulting internists.
The training authorities at home are supervising the in-
doctrination of these personnel, in order to keep them
abreast of their important mission.

VI.

<u>T Y P H U S</u>

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

1. Early symptoms, problems of evacuation and treatment.

Oberstabsarzt (Major, MC.) Prof. DENECKE

The early diagnosis is of decisive importance for the isolation and treatment of patients, but at the same time very difficult to establish. The early symptoms are extra-ordinarily rare. Subjective reports of physicians who were positive as to the time of infection state that restless-ness, pains in the back, and in the muscles made their appearance in the last week of the incubation period even before any fever was observed. The aching of the muscles is most generally observed as a slight fluctuating pain or a barely perceptible trembling. A slight tendency toward mental flightiness was observed in two physicians who are described as especially quiet persons in their healthy days. This mental aberration is of minor importance and not of a whimsical character, but comparable to the unrestrained feeling after having consumed too much alcohol. I have tried to check on these statements in other patients suffering from typhus and have found out that many patients could remember similar sensations at the onset of the disease. We have to beware of any suggestive questions and must be careful in the interpretation of psychic disturbances which are a part of the picture of the disease. The onset of typhus does not always occur suddenly and impetously, but is lingering and gradually increasing in about one third of the cases, similar to typhoid fever. Besides these subjective anamnestic symp-toms, the following objective symptoms in the incipient stage of the disease should be mentioned. The yellowish color of the fingertips, similar to what is observed after the use of Prontosil, a slight trembling of the lips, a certain involvement of the facial musculature and a fearful alert expression, which is rather striking in contrast to typhoid fever and a deep respiration. This deep respiration usually continues even if pneumonia is added as a complication. I have rarely observed labored breathing in a typhus patient suffering from pneumonia.

Constipation and palpation findings in the cecal area are some of the early symptoms which not infrequently raise the suspicion of appendicitis. The area of the cecum is sensitive to pressure over a wider area than in cases of appendicitis and furthermore the physician feels and hears a gurgling doughy mass during the palpation.

The exanthem is preceded by some sort of pre-exanthem which gives the skin a marble-like appearance.

STURM believes one can see an early symptom in the behavior of the white blood picture. He mentions an enormous shifting to the left of the leucocyte formula with the absence of eosinophiles and a proportion of 25 - 50 per cent of the stab cell leucocytes. Unfortunately this is not only an early symptom of typhus, but also of numerous in-fectious diseases, especially in young people. The reaction of the myelocytic apparatus to infections causes the same shifting to the left also in Volhynia fever, in angina,

diphtheria, and pneumonia. We also agree with STURM regarding the importance of the dry leathery tongue, but also this early symptom is too general to give the medical officer any differential diagnostic clue. But important indications should be given to troop medical officers with regard to early symptoms. If the medical officers do not discover typhus in patients early, the disease will spread and cause injuries to the patients who as a consequence will be evacuated too late.

The treatment has to start the very moment the evacuation begins. The patient suffering from typhus is probably the most sensitive of all infectious disease patients to transportation. The earlier the patient is evacuated the better he gets over the disease, unless he suffers from the rare stormy type of the disease. The reason for the transport hazards to patients suffering from typhus is the early involvement of the vasomotor and the almost regual simultaneous involvement of the myocardium. Therefore, it is necessary to take special preventive measures for such transportation. First of all the shortest possible route should be chosen and special protection against cold should not be forgotten. It is only possible to cut down the time of transportation if we desist from establishing special hospitals for infectious diseases and typhus patients, for these hospitals have to be located centrally in the Army District, that is to say far behind the lines. Moreover these hospitals for infectious diseases have a kind of suggestive influence on physicians who believe that the best care of the patients is guaranteed in such hospitals and therefore accept the long route of transportation. But this has a disasterous effect on the patients. The generally known better tolerance of the Russians to typhus is partly due to the fact that no transportation was provided for sick Russians. If it is possible to persuade the competent Army Surgeon to instruct the advanced field hospitals of the divisions, the main dressing stations and collecting points to establish small wards for patients suffering from typhus this would first of all prevent the hazard of a spreading of the disease during the evacuation to the hospital and second it will considerably decrease possible damage to the general circulation of the patients. A suitable protection against cold is imperative to prevent any collapse. This point must be given attention in case of transportation in "Akja" carrieages (a Russian carriage) and especially if carts or sledges are used. Many physicians attempt to stimulate the circulation by the administration of drugs, but I have never observed any advantage derived therefrom. It must especially be pointed out that peripheral vasoconstricting drugs such as Sympatol lend themselves for that purpose. But Cardiazol or Pervitin should not be used as they are stimulating drugs. If the patient is evacuated to a hospital, he will be left for quite a long time without any supervision and even the driver is not able to attend to him. The condition of the patient may quickly change for the worse and these drugs, due to their spasmodic and cerebral effect, may prove dangerous to the circulation.

The patient will rarely show cardiac symptoms during the
first transportation. Therefore it would be premature
to administer Strophantin on this occasion as is often
suggested. If the patient is really in such a bad con-
dition, it is not advisable to transport him at all, as
such a transportation may prove dangerous to life even with
an injection of Strophantin. STURM suggested that patients
showing any symptoms of heart trouble should be treated with
Digitalis. Digitalis would not have any effect on a periph-
eral collapse but the treatment with Strophantin is superior
to Digitalis for acute cardiac insufficiency in patients
suffering from typhus. In my opinion, the treatment with
Digitalis could only be used for convalescents with per-
sisting myocarditis or cardiac insufficiency.

Third: The treatment with the blood of convalescents
should be discussed in addition to the early symptoms and
the question of transportation. The most successful use
of convalescent blood is, according to my experiences, a
transfusion of 400 - 500 cubic centimeters intravenously
on the fourth or fifth day of the disease for the first
time and which may be repeated several times. Naturally
we do not have so many cases that we are able to compare
treated and non-treated patients. We routinely gave this
blood transfusion to all cases of typhus after we observed
the good results of this therapy in some serious cases.
Since this change in therapy was introduced in January 1941
when typhus reached its peak, it can hardly be presumed
that just this same time should mark the turn in that the
disease was milder in its course from then on. The blood
transfusion from a convalescent does not cut down the fever
nor the duration of the disease, but it acts favorably in
the sense of bringing about a milder course. MALY supposes
that the blood of convalescents stimulates the formation of
anti-bodies quite intensively. He even believes in a passive
transfusion of anti-bodies and he therefore suggests to
transfuse the blood on the fourth day after the defervescence
at the highest titer value of the WEIL-FELIX reaction. As
there are only a few patients in the field hospitals from
whom large amounts of blood can be taken on the fourth
day of defervescence, we have taken the blood of convalescents
only on the fourteenth day or even later and have finally
because of the evacuation of convalescents, also transfused
the blood of healthy soldiers who never suffered from typhus.
The same satisfactory effect was observed. Therefore it
may be assumed that the transfused blood is not effective
because of anti-bodies, but for some other reason. I
suppose that we have to deal with two different kinds of
reactions. The first reaction of the absorptive effect of
the surface of the erythrocytes on toxins. Typhus is,
just like diphtheria, one of the diseases which causes an
early and frequent toxic condition. The blood transfusion
seems to be the only successful remedy. The absorptive
effect is inherent in the blood of a healthy donor as well
as in that of a convalescent, but it may be, that in ad-
dition to this the blood of the convalescent contains
specific anti-toxins. But this factor is probably not
decisive as otherwise the serum of convalescents should be

effective, which is not the case according to all our ex-
periences and to the findings of WALTHER. Only SCHMIDT-
OTTO has expressed an opposite opinion based on the ex-
periences made by LYDTIN. I hope for a second effect of the
blood transfusion on patients suffering from typhus in
offsetting collapse. Because of the tendency of typhus to
a paralysis of the vasomotor system the typhus patient is
in constant danger of collapse. Since it is known from the
treatment of shock that a large blood transfusion is the
treatment of choice to prevent collapse by filling up the
circulation and presumably by a reflex initiation of a
peripheral vasoconstriction. It may also be replaced by
preserved serum. I have suggested that the military hos-
pitals behind the front lines, which hospitalize our con-
valescents recovering from typhus, preserve the blood of
the convalescents and send it to the hospitals near the
frontline. But there will be no need of preserving the
blood of convalescents if it proves that the blood of healthy
individuals has the same effect.

The blood transfused for the first time on the fourth
day of the disease, which may be repeated every second or
third day, according to the course, is the best remedy for
treating dystonia and is superior to all other methods for
treating the circulatory system. In my opinion one should be
particularly careful with the use of remedies stimulating
the circulatory system in case of typhus because when a
toxic clinical picture prevails only such additional medica-
ments should be used as are absolutely necessary and which
promise definite success. In cases of myocarditis Strophan-
tin only should be administered.

Dystonia reaching a high degree in typhus, generally
occurs, according to the new investigations made by STEIN,
in soldiers who are thoroughly exhausted and overstrained
in the front lines. As spot checks revealed hypocalcemia
was recently observed in typhus concomitantly with the
other symptoms. It is therefore possible that the calcium
therapy, as suggested by MEERENDONK, does not treat a specific
symptom of typhus but a wide spread general condition. The
favorable effect of calcium, especially with regard to the
nervous symptoms is beyond question. The combination with
AT 10, as proposed by STURM, is dangerous, if used without
appropriate control of the calcium level, as has actually
been done several times because of the influence of a
certain publication. A critical examination of the whole
scheme of treatment as proposed by STURM is recommended
because of the overdosage and use of Cardiazol without
even mentioning the necessary Strophantin and the success-
ful blood transfusion.

2.   Therapy for typhus.

Oberstabsarzt (Major, MC.) Prof. von FALKENHAUSEN

No form of chemotherapy has shown satisfactory results
in the treatment of typhus. The continued supply of large
quantities of liquid is very important. 5 per cent glucose
administered by continuous intravenous drip until about
5 liters are given, is advisable. The flushing out of
toxins is the objective of this treatment. The therapy
with convalescent serum has not succeeded at all. Blood
transfusion from convalescents which has been used in
seriously toxic cases of scarlet fever, based on analogous-
ly favorable observations has shown good results. About
30 very serious cases were treated with the blood of con-
valescents. Most of the patients showed prognostically
unfavorable extrapyramidal symptoms. Only three patients
died. Among them were the only two patients suffering from
severe erysipelas and the other (38 years of age) suffering
from severe necrosis of the muscles of the right arm. The
third patient was hospitalized in a moribund state. There
is no doubt that the blood transfusion of convalenscents is
the best available remedy for treating typhus at present.
In case a further severe incidence of typhus occurs, the
opportunity should not be missed to establish the definite
proof by a series of comparative examinations. The blood
transfusion of convalescents may be compared with the normal
blood transfusion.

Not more than 100 cubic centimeters of convalescent
blood was transfused in a single dose. This amount, how-
ever, was given on each of three successive days. Venesection
stimulates the formation of blood, but is not quite harm-
less for a convalescent recovering from typhus because of the
long lasting hypotonia. Treatment with convalescent blood
should be started as soon as possible (between the first
and fourth day) but a rapid recovery has also been observed
in the advanced stage of the disease. In regard to the
therapy of the circulatory system which is the usual approach
to the therapy of typhus, it must be mentioned that the
patients suffering from typhus usually have to undergo an
unnecessary and unsuccessful treatment with Digitalis. Only
in the incipient stage of decompensation it is necessary
to use a glycoside and then it should be Strophantin. But
usually an increase in peripheral tonus is sufficient
(obtained by a continuing medication of Sympatol). An
unfavorable effect of Sympatol on the seriously injured
nervous system has never been observed, while Strychnine
often produces irritation. The use of Cortenil (an adrenal
cortex preparation) has shown good results, especially
in shortening the long lasting period of convalescence due
to the chronic hypotonia.

Discussion:

DENNIG: Electrocardiographic disturbances are re-
gularly observed in patients suffering from typhus. This
refers mainly to the QT-wave and there is no deflection of

PQ as occurs in diphtheria and articular rheumatism. QT is prolonged while T is levelled off. It usually lasts for 6 weeks but sometimes even many months. But this is of no importance to the prognosis.

LYDTIN: The most essentail part of the objective early symptoms in typhus seems to me to be the enlargement of the spleen. This enlarged spleen may clearly be observed in the first three days of the disease. In 80 - 90 per cent of the cases, patients suffer from typhus before any symptoms of an exanthem appear.

The following indicates the result of the treatment with the blood of convalescents:

1. The blood of the convalescent who is in the late stage of the disease has no more effect than a normal blood transfusion. No decrease in the fatality rate has been observed.

2. In comparable investigations with serum of convalescents in the early stage of the disease, giving 125 cubic centimeters intravenously each of the first three days of the infection before the eruption of the exanthem - I have observed a considerable decrease of fatalities in all age groups. The results are statistically not quite guaranteed, but a high degree of probability has been obtained.

A series of treatments with atabrine-plasmochin used so as to be comparable in large numbers did not show any satisfactory results.

von BORMANN: The early symptoms of typhus mentioned by DENECKE are much too complicated and as they need a long clinical experience, it won't be of much use to field medical officers. A medical officer is not able to detect a barely visible exanthem in the scratched and dirty skin of a soldier in a badly lighted bunker. The psychic prodromal symptoms, the motor restlessness, the aching of "muscle waves" may - if they occur at all - perhaps be recognized and noted by a physician, who is just developing the same disease, but never by a youngster from the country. The medical officer needs some evidence, such as fever, headache and perhaps a palpably enlarged spleen. If in addition other symptoms are exhibited such as coarse finger tremor, somnolence, insomnia and bloated face, the surgeon will know how to proceed. At first it is not important that the diagnosis is exact but all cases of typhus have to be delivered to the main dressing station at the earliest possible time. It is of great importance to inform all medical officers of the epidemic situation in the area. Just as a commander of a battalion has to perceive the tactical situation of his neighboring formation, the medical officer has to report the epidemic situation. Then he will be able to diagnose the feverish disease.

SYLLA: In 80 per cent of the cases of typhus a clear prolongation of the latent period of dermographism has been observed in the first day of infection. This prolongation shows the decrease of the reaction capacity of the sick organism. If the time between the rubbing of the skin and the eruption of the rash takes longer than 15 seconds, typhus is expected and this helps one to recognize the disease in its early symptoms. The danger of gangrene of the extremities in cases of typhus has especially to be feared during the cold periods of the year. The reason for this gangrene may be the disposition to vascular spasm (cerebral irritation), which reactions are favored by chilling. Therefore it is necessary to keep the patients in well heated rooms in order to warm their extremities. - Finally one has to be careful to not overevaluate a new type of treatment, particularly as long as no reliable comparative reports are available. The death rate varies very much and gives rise to illusions. The total death rate of our Army amounts altogether to only 5.5 per cent.

GUTZEIT: The discussion has shown that again no proper opinion has been given concerning the best therapy in cases of typhus. This can only be gained by comparable investigations, the principles and application of which I have elaborated since 1940. Just the fact of the temporal changing of genus epidemicus compells us to use the controlled method of treatment at the same time in the same hospital without any separation according to the gravity of the disease. When testing the different methods of treatment one after the other the disturbing influences of genus epidemicus are never eliminated.

3. The psychic disturbances in typhus.

Oberstabsarzt (Major, MC.) Prof. von STOCKERT

The psychic disturbances associated with typhus can easily be reduced to 4 stages: the prodromal stage during the first three days, the peak of the disease from the end of the first week to the end of the second week, the stage of defervescence and fianlly convalescent. Two series of symptoms pass through all these phases like Ariadne's clue. Mental disturbances and a series of symptoms arising from the diencephalon which are characterized by blurred responsiveness of the mind and amnesiac disturbances.

While in the prodromal stage hypochondriac depressive and sometimes irritating euphoristic conditions occur quite often, and slowly change into a somnolence with a psychomotor inhibition, a delirious condition may develop during the height of the disease, which usually appears in the evening and night. In the stage of defervescence, or even three weeks after the defervescence occurs, sometimes an expansive

confabulatoric psychosis develops and the patient may assert that he has been promoted out of turn and has been decorated with the Knight's Cross of the Iron Cross. These psychoses usually subside after about 8 - 14 days. Finally a stage of convalescence follows after the disease which does not last longer than 3 - 6 months, which is characterized by a special irritation, mental derangement, disturbances in the throat and weakness in the mind. These psychic symptom. are usually accompanied by clear vegetative irritations such as disposition to sweating, alopecia and increased mechanical sensitivity of the musculature. It is advisable not to send a soldier, who has just suffered from typhus, to the front lines before a period of 6 months has elapsed.

Discussion:

SCHELLER: The following meningeal symptoms occur in the onset of the disease: Headache, sleeplessness, increased sensitivity. The reflexes of the legs are often diminished. The cerebro-spinal fluid shows a changeable inflammatory character, and the pressure is increased. Favorable influence of lumbar puncture on headaches, sudden irritation and in status epilepticus. At the end of the first week patients may suffer from delirium, epileptic fits and a semiconscious state. Amental psychosis usually occurs in the beginning of defervescence. Pseudobulbar disturbances (dysarthria, dysphagia, increased reflexes of the lower jaw) also striate disturbances of motion and catatonic symptoms all occur. Vegetative disturbances due to focal injuries of the diencephalon are seen. After the defervescence the following symptoms have been observed: peripheral paralysis, mostly ulnaris (4 to 5 per cent) and peroneus (3 per cent), the period for convalescence usually takes a long time and is marked by emotional weakness, disturbances in the memory and vasolability. The treatment with calcium has shown good results.

ZEISS: Referring to "The Escape" by G. GESEMANN - parts of a Serbian diary 1915/16 (Langen 1935). Self-observations about the symptoms of the disease during the first days as well as the dreams occurring during the acute fever-stage are recorded.

4. Pathological anatomy of typhus.

Stabsarzt (Captain, MC.) Dozent BOEHNE

1. Complications and cause of death in typhus.

Of 51 cases clinically and anatomically evaluated, 13 patients died of acute peripheral circulatory collapse (between the 9th and 14th day), 11 patients died of lobar pneumonia (between the 10th and 28th day), 13 patients died of broncho-pneumonia (between the 8th and 23rd day), 4

patients died of diffuse hemorrhagic glomerulonephritis
(between the 11th and 41th day), 5 patients died of general
infection (between the 19th and 32nd day), one patient died
of purulent meningitis (otitis media) (on the 42nd day), one
patient died of purulent pyelonephritis (on the 41st day).

a. Acute hemorrhagic glumerulonephritis

was observed in 15 of 60 autopsies. This was only recognized
clinically in two cases. Macroscopically there was a charac-
teristic picture. Albumin, erythrocytes and leukocytes
could be shown microscopically in the capsular space. Cy-
lindrical erythrocytes and leukocytes and distinct peri-
glomerular infiltration was seen. There was a frequent
association with petechiae and hemorrhage into the mucous
membrane of the kidney pelvis and the bladder.

b. Icterus hemolyticus

was proved in 22 of 47 cases. Histological signs of a
hemolytic icterus: the strongly distinct hemosiderosis of
the spleen, bone marrow and kidney, also in new cases between
the 10th and 12th day, a hemoglobin-nephrosis and hemoglobin
casts, a pleiochromia of the bile and bile casts in the
biliary ducts, chemically an indirect positive diazo reaction
in the blood and a negative bilirubin and positive urobilin
reaction in the urine. The hemolytic icterus has also been
observed in fatal cases of typhus without any complications.

c. Erysipelas of the mucous membrane in the throat

In two cases a general streptococcus infection appeared as
a severe edema of the mucous membrane with few leukocytes,
but with many diplococci. In both cases a purulent peri-
chondritis of an arytenoid cartilage was observed.

2. The histological picture of typhus exanthema

as found by examination of 14 roseolas from the 4th to the
18th day of the infection. Exclusively lymphocytic and
plasma cell infiltration around the arterioles of the sub-
papillary structure of the skin. No wall necrosis and no
papules have been observed on arteries. No differential
diagnosis can be made from similar infiltrations in the
exanthem of streptococcal and meningococcal sepsis. It
is of practical importance for abortive cases of typhus with
negative WEIL-FELIX reaction.

3. Histology of typhus papules in the brain.

In new cases (8th to 10th day) clear cut mesodermal
reactions may be observed especially in the arterioles,
which, however, do not involve the gliosal basal membrane.
Distinct regressive changes of the wall with swelling, plasmo-
cytic imbibition, dissolution and pyknosis of endothelium.
By thorough examinations of new cases there were no symptoms
of loss of protein from the vascular lumen nor by the
application of fibro-stains. Erythrodiapedesis which even
in old cases is without reaction of the surroundings, is
probably due to peristatic or prestatic (original German

testprestatic) processes in the final stage. The disappearance
of the papules takes place by a progressive scattering, during
which the Hortega cells disperse and are lost in the surround-
ing tissues after the poisonous effect has ceased. No glial
scars can be demonstrated.

4. Myocarditis exanthematica

is marked by a diffuse interstitial, mostly histiocytic, in-
flammation which generally disappears on the 30th day. No
regressive changes of the muscle fibres and no parietal en-
docarditis or thrombosis has been observed in clear cut cases
of typhus. Arterial thrombosis has been proved in three
cases and a purulent mesarteritis of the A. tibialis ant. was
histologically demonstrated in one case.

5. Changes of the fundus in cases of typhus.

39 cases were thoroughly examined. Severe infiltration
in the supporting tissue of the optic nerve and hyperplasia
of the glial cells. In the soft covering of the optic nerve,
a slight endothelial proliferation, as well as a slight peri-
vascular lymphcell infiltration has been observed. Severe
capillary enlargements with lymphocytic infiltration in the
choroid, either lymphocytic or pure histiocytic infiltration
is seen in the retina.

6. Bacteriological investigations on corpses.

Thorough bacteriological examinations are always necessary
in order to investigate the cause of death and to classify
the histological parenchymal changes. Typhus is inclined to
severe secondary infection, in numerous cases rickettsia con-
ceal a general infection by streptococci. In 26 cases the
smear of the throat and larynx showed 12 cases of bacterium
diphtheriae, while 23 smears of the bronchi showed hemolytic
streptococci or staphylococci 19 times.

7. Serological examinations on corpses.

Serological examinations of the blood, spinal fluid,
and serofibrinous pericarditic fluid after the method of
WEIL-FELIX have been made on 38 corpses. Positive loss of
reaction in accordance with the findings in clinics with a
titer up to 1:51,200 in the blood and 1:512 in the spinal
fluid. In 3 cases a negative failure of reaction has been
observed similar to the negative "WEIL-FELIX" findings in
living persons. Non-specific positive failures of reaction
were sometimes observed in icterus and miliary tuberculosis.
The "WEIL-FELIX" reaction on corpses is considered important
in vague continued occurrence of infectious diseases under
field conditions without any anatomically specific basis.

Discussion:

HERZOG: Neither in all the cases of typhus I had to deal
with during World War I (about 40 cases), nor in the present
cases (about 20), have changes of the heart been absent. They

are quite different than diphtheria. In spite of severe
inflammatory changes, almost no muscle necrosis has been
observed. In the skeletal musculature it usually appears
as wax-like degeneration. Severe interstitial hemorrhages
occur, sometimes in the kidney, due to considerable changes
in the small and medium sized arteries with necrosis of the
media. As for the rest one may refer to the report in the
"Zentralblatt fuer Allgemeine Pathologie", Band 29, 1918
(Central Journal for General Pathology, volume 29, 1918).

DIETRICH: BOEHNE and the physicians who were present
during the first of these meetings, have given little con-
sideration to or have denied the possibility of early diag-
nosis in typhus on the basis of the microscopic changes of
the skin in the stage of exanthem. I have taken up again
the quick diagnosis, recommended by FRAENKEL, because the
WEIL-FELIX reaction is, as a result of my experiences,
frequently negative in the beginning and the early recognition
of sporadic cases at home make an early diagnosis desirable.
It is possible to obtain a positive finding on the roseola
in a few hours by rapid imbedding (acetone-paraffin). This
method naturally is the source of certain errors which begin
with the excision. But in numerous cases we were successful.
We cannot yet give a decisive opinion about the accuracy,
but further investigations should be made.

BOEHNE: In contrast to the previous opinion that the
incubation period amounts to 21 days, an incubation period
longer than 12 days was never observed. As a rule the period
of incubation is 9 days. In cases where a longer incubation
period has been reported, the exact time of the infection
usually could not be established.

HALLERVORDEN: Typhus is a meningo-encephalitis. In
each case of meningitis the outer and inner surface of the
brain is infected. In this latter kind of the disease the
vegetative center is affected so that no special infection
of it has necessarily to be expected. The papules are over-
evaluated, as they are so striking. They are a reaction of
the brain to the extravasation of blood and plasma. Their
presence is not a symptom of the involvement of the part
concerned. Mesoblasts have only a slight effect on the
papules and do not show any persisting changes.

DIETRICH: In cases of hemolytic changes (liver, kidney),
one has to inquire whether the patient has been treated with
the blood or serum from a convalescent.

OSTERTAG: It is important to recognize those diseases
which make typhus more complicated. The complications and
contradictions in diseases have to be differentiated. I
have observed for instance positively diagnosed scarlet
fever and 8 days after the scarlet fever exanthem appeared,
typhus and agranulocytosis. Some infections of the nursing
personnel seem to take an extraordinary course. P.W.'s who
took care of Russians suffering from typhus fell ill with an
undulating fever (clinical influenza, autogenous typhus).
The appearance of damage in the liver due to sulfonamide
therapy should be especially looked for in cases of typhus.

MUELLER (Koenigsberg): In 100 postmortem examinations of typhus cases only one clear case of icterus has been observed. The increase of icterus in cases of typhus may depend on regional conditions.

BOEHMIG: Other organs (heart, kidney) seem not always to be infected. In numerous cases I have neither observed any changes of the heart or kidney nor any principal changes, such as have been described by FRAENKEL.

SIEGMUND: I refer to the conformity of the histologic picture which has often been observed in diseases of the same derivation, such as hospital infections. In all the examined cases an unusually wide-spread arteriolar necrosis of almost all organs has been observed. The formation of papules in the brain are ectodermal gliosal proliferations due to resorption and they are not only in correlation with capillaries but also with arterioles, in which the symptoms of an increased permeability after damage to the endothelium may more easily be proved anatomically than in capillaries.

BOEHNE: (Summary) No effect of blood transfusion has been observed on the histological pictures, which are in general like hemolytic icterus. During the postmortem examination of typhus cases no icterus epidemic was present. The sector-shaped arteriolar necroses with formation of papules have not been observed. Diffuse histiocytic in-filtrations of the myocardium were observed in almost all new cases. No correlation of extravasation of blood cells or plasma with newly appearing papules has been observed.

Directions:

Important for diagnosing typhus is the early appearance of psychic disturbances in the manner of an exogenic type of reaction. A remarkable characteristic is the absence of the usual feeling of being sick and recognition of this disease in the prodromal stage is unusual because of a kind of mixed effect. During this time there is the additional danger of self-injury and committing suicide. If the fully developed symptomatic picture of the disease is subsiding, one has to be cautious about expansive confabulation with boasting and swindling tendencies.

The WEIL-FELIX reaction, which usually reacts positively on such patients, has to be used even if no physical ap-pearance of typhus has been observed. It is advisable to treat the patients in a hospital for typhus for a period of about 6 - 8 weeks. After that they have to be evacuated to a sanatorium where they may stay for about two months. It is also advisable to grant the patient a sick leave for about 4 weeks to recover his health. As a rule patients are therefore on the sick list for about 6 months. This also refers to cases of infection which seem to have taken a mild course, as they also produce temporary changes of the character, which may give rise to considerable disciplinary difficulties. In the forensic-psychiatric judgement, special care has to be taken on patients who have just recovered from typhus. The WEIL-FELIX reaction has to be used in such cases.

VII.

PARATYPHOID C, WOUND DIPHTHERIA, SCARLET FEVER AND HEMOLYTIC STREPTOCOCCI

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

A.   Paratyphoid C.

1.   Paratyphoid C.

Stabsarzt (Captain, MC.) Prof. HABS and Kriegs-
arzt (War Surgeon) BADER

Paratyphoid C is a febrile disease with symptoms re-
sembling those of typhoid fever, caused by a bacillus of
the Suipestifer-group. Paratyphoid C was observed in the
Balkans and in the near East during World War I and in
Russia after the War. It has also been observed in the
Balkans during World War II.

The disease starts with a sudden fever which lasts
from a few days up to two weeks and which subsides by lysis.
During the continued fever a bradycardia has been observed.
Roseola are generally missing but an enlarged spleen has al-
ways been observed. The intestinal canal is not infected.
A bronchitis is almost regularly observed, which may develop
into broncho-pneumonia. A leukopenia is important for diag-
nosis. The diazo test may show a positive reaction in the
urine. The sedimentation rate is comparatively rapid. The
excitants are easily found in the blood, but only exception-
ally in the stool.

Paratyphoid C may occur as an autonomous disease, but is
usually observed as a complication appearing in malaria,
relapsing fever, dysentery and other infectious diseases.

The excitant of paratyphoid C has been proved as the
type Orient (Salmonella paratyphoid C) and the type Sui-
pestifer Kunzendorf (Salmonella cholerae suis var. Kunzen-
dorf). Probably the type America (Salmonella cholerae suis)
is also an excitant.

The route of infection by paratyphoid C is not yet
quite clear. Since the excitants are very rarely excreted
with the stool and constant carriers are not known, a spread
of the disease exclusively by contact from man to man is
not likely. It is assumed that animals are the primary
sources of infection. But there is no such proof for the
type Orient. The type Kunzendorf is often found in animals,
especially in pigs.

Suipestifer bacilli and usually the Kunzendorf type
may cause acute gastro-enteritis just as the other typhoid
diseases, which are usually due to eating contaminated
food from infected animals and which may lead to mass-
infection.

Suipestifer bacilli are found, just as other bacilli, in
the paratyphoid enteritis group, as the excitants of purulent
inflammation and acute septic diseases, which usually occur
in the course of other infectious diseases. Only diseases
resembling typhoid fever may be called paratyphoid C.

Full particulars will be described in the Klinische
Wochenschrift, 1943.

B. <u>Wound diphtheria</u>.

<u>2. Wound diphtheria.</u>

<u>Oberfeldarzt (Lt. Col., MC.) Prof. BUERGERS</u>

Wound diphtheria, which was first observed by BARD in 1771 and was described anew by BRUNNER in 1893, has probably played a greater part in older times than more recently. The cases of this disease which frequently occurred after World War I, have been described by LAEWEN and REINHARDT, ANSCHUETZ, KISSKALT, WEINERT, LOEHR, ROHDE, DONGES and ELEFELDT, NIETER and KEHL and have drawn the attention of surgeons and bacteriologists to this disease. The extraordinary variable percentage of positive cases, something between 5 to 75 per cent probably is correct because the cultures which were found were not examined in regard to all the characteristics of true diphtheria. Besides the works of the above mentioned authors, we refer to those of BRUNNER, ROSER, EHRHARDT, ZUELIG, DEUTSCHLAENDER, LANDE, LANDAU, GROSSMANN, RADICE, HOFFMANN, KILIAN, BALHORN, and HORN. The following bacteriologists have made investigations from the bacteriological point of view: KLIEWE, LUBINSKI, PESCH, HETSCH, SCHLOSSBERGER, and CLAUBERG. WEINERT distinguishes clinically the following points:

1. Surface and croupous form

2. deeply seated, diphtheritic-necrotic form

3. phlegmonous form.

DEUTSCHLAENDER distinguishes the following:

I. Skin diphtheria as a part of a generalized diphtheria,

II. Skin diphtheria as a locally limited independent disease,

1. Skin diphtheria of the pathologically changed skin,

a. True wound diphtheria (real wounds, not only injuries of the surface of the epidermis,

b. Diphtheria with inflammatory skin processes,

2. The diphtheritic inflammation of healthy skin,

a. the ulcerating skin diphtheria,

b. the phlegmonous skin diphtheria.

LANDE describes the following forms in children:

Ulcerous form, naval diphtheria, intertriginous form behind the ear, superficial form with a thin membrane, impetiginous form, small blisters similar to varicella, diph-

therial paronychia, vulvar diphtheria and phlegmons as hard
as a board. The following classification seems to be
suitable for surgery during the war:

    1.   <u>True wound diphtheria</u> with rapid deterioration
of the wound, excess granulations, ulcer formation with
pseudo-membrane, pointed undermined margin of wound,
intense rubor of the environment, pure cultures of
diphtheria bacilli or mixed cultures with enterococci,
staphylococci and streptococci.

    2.   Clinically suspected wound diphtheria of similar
appearance or with greasy coat, with bacteriological
findings of all kinds of pus forming bacteria but not
true diphtheria bacilli.

    3.   Normal appearing wounds with bacteriologically
proved true diphtheria bacilli, either in pure culture
or with pus forming bacteria.

    Forms 1 and 2 show an inadequate tendency to heal. Form
1 only should be described as wound diphtheria. Form 1
usually shows no temperature, while form 2 frequently has
a high temperature and form 3 is entirely free of temperature.
Since either LOEFFLER's serum or CLAUBERG's culture medium
dextrose has been used for diagnosis in most laboratories,
<u>diphtheria has often been mistaken for hyperacidic pseudo-
diphtheria</u>. True diphtheria can easily be differentiated
from hyperacidic pseudodiphtheria by the use of modified
CLAUBERG culture medium using serum or ascitic fluid instead
of blood and with saccharose. Intracutaneous tests on
guinea pigs with true diphtheria shows a clear suppuration
and necrosis as well as edema in cases of gravis and inter-
medius strains but slight suppuration and edema was observed
with the mitis strain, while in cases of hyperacidic pseudo-
diphtheria, only leucocytic infiltration without any edema
has been observed. Subcutaneous tests with hyperacidic
pseudodiphtheria will never kill a guinea pig. The importance
for pathology must be established by histological investiga-
tions. The appearance of throat diphtheria proceeding from
forms 1 or 3 may occur. (Because of the possibility of in-
fecting the air by the carriers of diphtheria bacilli among
the soldiers and visitors, it is difficult to establish
the causal proof for the infection of wounds.) Only few
cases of paralysis have been observed with form 1, while
they have never been observed with form 3. Serum injections
are indicated in toxic cases, but they do not influence the
healing of the wounds. The treatment with chinosol is
recommended for therapy in form 1 and 2; 1:1,000 up to
1:2,000 alternately with Marfanil powder. As to the necessity
of the local serum treatment recommended by CLAUBERG,
critical examinations must shed light on this question.
The local serum treatment seems to be superfluous in form
3. The examination of the environment, as suggested by
CLAUBERG seems to be too extensive a measure because of
the shortage of material used in laboratories and the fre-
quent moving of wounded soldiers within a hospital. This
method should be used only in true clinical cases of diph-
theria. In all cases in which diphtheria bacilli have bac-
teriologically been proved in wounds, a diagnosis of the
type would be advisable.

Discussion:

HAAG: Cases of throat diphtheria occurring among the
nursing staff were followed by a true wound diphtheria in
3 military hospitals in Bad Nauheim. It is absolutely
necessary to differentiate between corynebacterium diph-
theriae and corynebacterium pseudodiphtheriae in cases of
wound diphtheria and in carriers of diphtheria bacilli.
In order to get a general view of the present criteria, I
have sent a circular with the corresponding questions to
about 100 civilian laboratories. The answers to these
circulars show that greatest importance is attributed to
the morphological picture and to the examination of toxicity,

BIELING: Soldiers with reportedly positive findings
of diphtheria bacilli in wounds, throat or nose, based on
bacteriological examinations, should be isolated for many
weeks. When examinations on guinea pigs (intracutaneous)
show no toxin-forming strains, the patients do not need to
be isolated. An antitoxin treatment in cases of wound
diphtheria will be administered too late if specific general
toxic symptoms have already developed. Therefore it is
advisable to treat each case of true clinical wound diph-
theria prophylactically with several thousand units of
anti-toxic serum.

Directions for the diagnosis of wound diphtheria.

Only those cases should be diagnosed as wound diph-
theria which show clinical pseudomembrane or a greasy coat,
sharply undermined margins of the wounds, glassy granulation
and intense rubor of the area, when true diphtheria bacilli
with all typical symptoms have been found. As such wounds
frequently have been mistaken for hyperacidic pseudodiph-
theria, the modified CLAUBERG culture with saccharose has
been recommended. The finding of diphtheria bacilli in
normal wounds should not be diagnosed as wound diphtheria
but as "bacilli carrier".

C. Scarlet fever and hemolytic streptococci.

3. Scarlet fever and hemolytic streptococci.

Oberarzt (1st Lieut., MC.) Prof. von BORMANN

In the report of the "Army Medical Inspectorate" of
June 11, 1942 it says: "The appearance of hemolytic strepto-
cocci is only an accompanying symptom in cases of scarlet
fever, and is not to be considered as the only cause of
scarlet fever according to the present state of information".

At first I should like to examine whether the designati.
of the hemolytic streptococcus as a causative agent is justi-
fied. The old standards of HENLE to prove the causal re-
lationship of a germ to a disease are as follows:

1.   regular finding of the germ in all patients,

2.   the possibility of obtaining a pure culture of
      these germs,

3.   Imitating the disease by infecting an animal with
      a germ obtained from a pure culture.

To 1: Hemolytic streptococci are found in all new
cases of scarlet fever. They are found in pure culture or
almost pure culture. It has to be considered that a 100
per cent culture occurs only if the smear is inoculated
immediately on a culture medium at the patient's bed side.
The previously transported tests show a negative result in
most cases. Hemolytic streptococci have regularly been
found in complications containing pus. Numerous hemolytic
streptococci have also been observed in the environment of
the patient such as the bed, crockery, room etc.

To 2: The pure culture of hemolytic streptococci from
scarlet fever presents no difficulties.

To 3: We don't know any experimental animal which is
sensitive to scarlet fever. The Drs. DICK have painted
the throats of 12 adult volunteers with pure cultures of
hemolytic streptococci from scarlet fever patients in 1923.
Three of them suffered from scarlet fever, two of them
suffered from angina, and it should be emphasized that they
were adults. TOYODA and his colleagues have tried the same
experiment on three children 3 - 7 years of age. All three
children suffered from scarlet fever. The diagnosis has
been proved perfectly by the positive signs of scarlet
fever. One has referred, however, to the experiments made
by Americans and Japanese who used fresh streptococcus
cultures. It might be that the virus - presumed by the
proponents of the virus theory - adheres to such fresh
cultures of streptococci and these two combined produce
scarlet fever. CYNCA and GHEORGHIN could not actually cause
any scarlet fever in men with the 5th and 12th passage of
scarlet fever streptococci and TOYODA and his colleagues
did not succeed in the 150th passage. The passage referred
to no longer had a toxic effect, but had forfeited the
ability of producing scarlet fever toxin.

Scarlet fever streptococci have fulfilled the three
standards described by HENLE as stated by the above men-
tioned authors and proved by his own experiments. But not
only that - he is able to explain the very complicated scarlet
fever pathogenesis. The Drs. DICK have proved that scarlet
fever streptococci produce an ectotoxin. If a predisposed
person is vaccinated with a sufficient quantity of the so-
called DICK-toxin, this may produce a scarlet fever-like rash.

Such a scarlatinoid is not infectious, it shows also no
complications, no angina and the streptococci are absent.
Persons who are pre-disposed to scarlet fever become immune
when vaccinated with the DICK-toxin. The skin test using
this toxin made the prediction of predisposition to scarlet
fever possible - similar to diphtheria cases. For some
time there was a great confusion about this DICK-test.
Persons with a negative reaction suffered from scarlet
fever and on the other hand patients who recovered from
scarlet fever showed a positive result. The occasional
misunderstanding has been entirely explained by TOYODA and
SZIRMAI. The so-called DICK-toxin contains products of
disintegration of streptococci - that means secondary toxir
besides the ectotoxin. This gave rise to the confusing
results, but when using a purified toxin, everything harmon
izes well. If horses are inoculated only with toxin or
with streptococci without toxin, an antitoxin serum will
be produced, the antitoxic effect of which in scarlet
fever is rapid.

It has been tried to put scarlet fever on equal terms
with diphtheria and to explain its clinical symptoms with
the idea that scarlet fever streptococci occur in the throat
and flood the whole body with toxin. Only the symptoms of
the onset of scarlet fever, such as fever, rash and so on -
are herewith explained. Besides scarlet fever streptococci
have - in contrast to diphtheria bacilli - a pyemic septic
effect. This explains the invasion into the sick body,
complications and sequelae. The immunity after scarlet
fever is twofold. The convalescent gains a lifelong anti-
toxic immunity. He will never be reinfected by a typical
case of scarlet fever. The antibacterial immunity remains
for only a short time. The patient being immune against
the disease scarlet fever,   may often be infected with
the causative agent of scarlet fever, angina rhinitis,
otitis, abscesses or even erysipelas. Therefore such mild
cases of the disease occur frequently in the environment
of a grown up suffering from scarlet fever. These cases
usually take a mild course as the toxin has no effect on
these patients.

It would not yet be decided whether the ability to
produce large quantities of DICK toxin is due to a special
strain of streptococci, respectively if each hemolytic
streptococcus may undergo such a state at some time. But
this is of no practical importance. For us it is enough
to know that hemolytic streptococcus is the causative agent
of scarlet fever.

Now returning to the report of the "Army Medical
Inspectorate": "We can only agree with the refusal ex-
pressed in the above mentioned report of extensive bacterio-
logical examinations for hemolytic streptococci and the
treatment or even setting apart of streptococcus carriers.
It makes no sense to examine the environment of a patient
showing hemolytic streptococci. They are found in some
patients in any case, but the bacteria wander about and they
are found in one patient today and in another tomorrow.

The patient suffering from scarlet fever has to be isolated as otherwise too intensive infections would originate from him and besides he needs careful nursing. The environment has to be treated differently, it depends on whether the disease occurs in a fighting troop or in a unit behind the lines. The unit of combat troops has especially to be watched and they must not get in touch with healthy units for about two weeks. But all the men of the infected units do not have to undergo treatment. If a man from a unit behind the lines is infected, all the men of this unit have to be put in quarantine for 10 days. This is necessary, especially in towns with a large population. In a unit where scarlet fever occurs over and over, all men of the unit have to be inoculated.

Discussion:

HABS: Would like to have a directive for isolation and treatment.

BUERGER: Protective inoculation has to be followed by careful observation. Scarlet fever convalescents have to be treated with sunlight and fresh air. Gargling with a disinfectant three times a day sometimes shows good results.

WAGNER: Whenever cases of scarlet fever have occasionally increased in the Navy, immunization with Scarlatox has been tried besides the general preventive measures. Severe reactions occurred occasionally. In counteracting scarlet fever by immunization, it would be necessary to inoculate the recruits directly after having joined the Army.

KROEGER: Protective inoculations made during an epidemic occurring in the Labor Service did not show any convincing result (this has been the experience for two years). All recruits have been inoculated against scarlet fever in the autumn of 1942, in order to prove the effect.

RODENWALDT: House epidemics in large hospitals disappeared entirely after a thorough scrubbing-disinfection. Importance must be attached to the necessary limitation of crowding in regard to scarlet fever streptococcus as related to house infections.

KLIEWE: Reported about the good results gained with disinfectant aerosol for counteracting scarlet fever. A mixture of ethylenglycol-resorcin-alcohol-water has been vaporized in a suitable apparatus twice a day for one hour.

NERLICH: General measures had almost the same effect as inoculation on the Eastern front. Critical remarks were made about the evaluation of preventive measures.

VIII.

<u>T U B E R C U L O S I S</u>

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor
Medical Section

**1.   The effect of special types of climate on the treat-
ment of soldiers suffering from tuberculosis.**

Oberstabsarzt (Major, MC.) Dozent DEIST

In greater Germany one can find all types of climate
besides the high mountain climate and the Southern climate
which are suitable for rest cures. The courses of treat-
ment for soldiers in high mountains can be followed at the
German Military convalescent hospital in Davos but the small
number of beds available limits the number of patients. The
effective factors of the high mountain climate characterize
it as a stimulating climate which is advisable as a healing
factor only for cases of active tuberculosis. A spotcheck
of soldiers who have been treated there since the beginning
of the war, shows that this indication has not been observed
in about 40 per cent of the cases. Transgression occurred
in both directions. In some cases the necessity of high
mountain cures was exaggerated and on the other hand the
uselessness of such a therapy was stressed. The patient
suffering from tuberculosis is oversensitive to the rays
of the sun and as this is an important factor of the high
mountain climate, this means a burden to him. Patients
suffering from pulmonary tuberculosis will profit by the
high mountain climate not only if they can tolerate but also
if they can utilize stimulation. Elderly patients with
progressive tuberculosis with complications in the heart
are not suitable for high mountain cures. Patients suffering
from extrapulmonary tuberculosis may be very suitable for
high mountain cures, if they do not suffer from active
pulmonary tuberculosis at the same time, because the rays
of the sun influence these tuberculosis processes favorably.
Necessary operations have to be performed before the be-
ginning of the high mountain cure.

**2.   Russian P.W.'s suffering from tuberculosis and their
effect on the German population.**

Oberfeldarzt (Lt. Col., MC.) Dozent NICOL

The introduction of masses of people always increases
the danger of epidemics such as infectious tuberculosis.
Russian P.W.'s working in Germany constitute a danger for
the German population. 75,000 X-ray pictures have been
evaluated in regard to the incidence of tuberculosis in
Russian P.W.'s. There is considerable danger for the
German population as a result of the use of Russian P.W.'s
working in Germany. These P.W.'s have to be X-rayed before
being assigned to labor duties. Moreover the P.W. camps
must be hygienically satisfactory since no valuable working
power should be lost or become new sources of infection.
Therefore the method of X-ray should be applied. If active
tuberculosis has been detected by examining the sputum,
the patient has to be isolated in special departments of
the P.W. camps for protection of the others. As to active

tuberculosis in the P.W. camps, there were more than 3860 fatal cases reported by 11 different Military Districts. These reports speak of rapid death which shows that active tuberculosis is concerned. The photofluoroscopic examinations showed a relatively small number of old cases of tuberculosis, but usually early cases. The incidence of tuberculosis seems to be an early epidemiological stage in Europe and above all in Asiatic Russia, as has been observed in cases of tuberculosis among the Kalmuecken and Kirgisen peoples during World War I (Negro tuberculosis The process of tuberculosis is accelerated in the Russians by malnutrition and great physical strain.

If Russian P.W.'s have been assigned for labor duties in Germany before being systematically examined by X-ray, this must be done afterwards by the Board of Health or by the physicians of the factories. P.W.'s found to be infected have to be evacuated to a military hospital for P.W.'s. It is necessary to report such cases to the Board of Health in order to investigate the environment and to warn the population.

3. The different types of tuberculosis in soldiers at the front.

Oberfeldarzt (Lt. Col., MC.) STEINMEYER

My report relates only to soldiers of the Eastern Army and only to 1282 cases occurring from the 22 June 1941 until the 15 September 1942. These cases consisted of 1064 men of the Army, 173 men of the Airforce and 45 sailors of the Navy. The number of 72 officers is relatively high in proportion to 1210 non-commissioned officers and soldiers.

The distribution of ages is rather interesting as in 102 soldiers under 20 years of age the inherited pre-disposition to the disease amounts to 24.5 per cent, and if acute onset is considered the figure will be 38.2 per cent. That is to say, the younger they join the Army, the more cases of the disease occur and the more severe is the disease. Thus the considerable percentage of all age groups with an inherited pre-disposition is 19.8 per cent which together with 7.02 per cent of erroneous inductions makes a total of 26.82 per cent of unfit soldiers due to tuberculosis. That proves that a careful recording of the anamnesis at the mustering of recruits and at the first medical examination would have prevented a considerable number of cases and would have kept the Army free from infections. It is remarkable to observe the increase of cases amounting to 27.6 per cent occurring in officers between the age of 41 - 50 years and an increase of 100 per cent among officers over 50 years of age. While the age group between 21 - 25 years holds the first place with 390 patients, the age between 31 - 40 years holds the second place with 377 patients.

As to the acute onset of the disease the number of
men under 20 years of age is, with 38.2 per cent by far
the highest, while among patients falling under the group
I of RANKE's classification the percentage will be 14.7
per cent and under group II the percentage will be 35.2
per cent. The total examination of the material was
classified by RANKE's concept in order to guarantee a
uniform and uncomplicated task. If the patient material
under treatment, falling under group I of RANKE's classi-
fication, is considered as not infected at the outbreak
of the war, we will arrive indirectly at a percentage of
73.5 per cent. Considering, however, only the patients of
group I of RANKE's classification, the percentage will be
95.3 per cent and if finally an acute onset is considered,
the percentage will be 74.8 per cent of positive reaction
to the Pirquet test on the day of admittance. Undoubtedly
the soldiers catch an infection more easily and much more
rapidly after having left school while at their trade or
after entering the Labor Service, so that in my opinion,
the estimate of at least 75 per cent may be considered as
infected persons (sic). This explains that in recruits
of the Labor Service the most primary forms of tuberculosis
have been observed with the similar course as in cases of
postpuberty tuberculosis with a general spread immediately
following a primary outbreak: Meningitis, miliary tuber-
culosis, severe caseous foci and extrapulmonary forms.

The number of 870 cases with lingering onset among
942 cases of group III of RANKE's classification corresponds
to the clinical opinion that the lingering onset is due to
immuno biological factors and gives the cardinal number of
exacerbations of tuberculosis only after breaking through
the resistance to the infection.

The relatively high number of 340 primary, super and
newly infected persons proves that the unknown source of
infection is all the more dangerous the larger the number
of non-infected soldiers in the Field Army. The induction
of 90 infected soldiers - 7.02 per cent of the total material
illustrates this danger and emphasizes the necessity and
the value of the photofluoroscopy which is the only certain
filter to prevent the induction of tuberculous men. Exudative
pleuritis plays a considerable part and is still under-
estimated by the recruiting and field physicians. This
occurred in 117 cases as primary and secondary tuberculosis
and in 84 cases as pleuritis accompanying an already exist-
ing tuberculosis of the organs (RANKE III). The connection
between the tuberculosis in the lungs and injuries has been
proved 24 times = 1.87 per cent while the connection between
accidents and tuberculosis of the lungs has been proved
5 times = 0.39 per cent.

Since 1914 the professional literature has properly
presented the principles that no war tuberculosis exists
and no new kind of tuberculosis has occurred during the
campaign on the Eastern front, but all different symptoms
are arranged in the well-known scheme reported by RANKE,
ASCHOFF, NICOL, ALBRECHT, ULRICI, NEUMANN and others. The

predisposition of the recipient, however, has changed in
comparison to the campaign in Poland and on the Western
front. The length of the Eastern Campaign, the severity
of the fighting, the primitive nature of the accommodations,
the irregular food supply, the changes of the climatic
conditions and the influence of the mental conditions by
way of the vegetative nervous system and the endocrine glands,
a fatigue which goes far beyond the physiological limits
and on the other hand an unnatural acceleration of the wear
and tear processes have influenced the usual power of re-
sistance and have decreased or even eliminated the exist-
ing specific immunity to such an extent, so that there is
no more protective power. Only in P.W.'s have I observed
the increase of the acute forms of tuberculosis in the sens.
of general spread, exacerbation, the predominant exudative
and especially the pneumonic and bronchopneumonic components,
as well as the rapid violent course with unfavorable prog-
nosis, because of the increased psychic depression during
their imprisonment. The percentage of these forms amounts
to 25 per cent and they seem to gradually be gaining pre-
dominance among the patients delivered from the Eastern
front. It is undoubtedly much more favorable to overcome
the primary infections during the childhood than in adult-
hood, especially under these difficult conditions of the
war. Primary and secondary tuberculosis in the state of
general spread, show an unfavorable reaction to collapse
therapy, as they have not yet produced a humoral immunity.

Since the beginning of the war, there has been great
lack of suitable beds for patients suffering from extra-
pulmonary tuberculosis. Out of 185 cases of extrapulmonary
tuberculosis, 100 cases occurred among soldiers of the
Field Army, of which 91 cases were observed in the Eastern
Army and 85 in the Replacement Units. 8 of these 91
patients were under 20 years of age, 39 were between 21 -
25 years, 20 between 26 - 30 years, 20 between 31 - 40
years and 4 between 41 - 50 years of age. Acute onset
was observed in 25 cases and lingering onset in 66 cases,
RANKE II occurred in 30 cases and RANKE III in 61 cases,
while 2 cases occurred in connection with an accident and
one was due to an erroneous induction.

I still have the impression that extrapulmonary
tuberculosis occurs more frequently now than during World
War I. The crux of this matter is a long lasting healing
process so that the beds are usually occupied for quite
a long time. The tuberculosis is usually diagnosed too
late, especially when occurring in the vertebral column
and in the hip joint, while rheumatism in the muscles and
joints, sciatica and others are usually erroneously diag-
nosed. The roentgenological diagnosis of tuberculosis in
the bones and joints may only be attained after many years
of experience, on the other hand it is not unusual that in
cases of extrapulmonary tuberculosis which have been diag-
nosed at the right time, about 25 per cent of patients
suffering from concurrent infectious pulmonary tuberculosis
have been overlooked.

4. Tuberculosis diagnosed at the right time in the field.

Oberstarzt (Colonel, MC.) Prof. SZERREIKS

The following difficulties hinder the extensive X-ray investigation for diagnosing tuberculosis in the Army:

1. the tactical situation, especially in combat divisions,

2. the great distances,

3. the lack of trained physicians,

4. the shortage of suitable equipment.

It is impossible for the field divisions, especially for the ones of the Eastern front, to undertake such tasks, as the existing X-ray equipment is unable to achieve the necessary results. Irregular evaluation of the findings could not be avoided and would in some ways become rather dangerous. An adequate number of specialists would not be available for the establishment of observation hospitals behind the lines.

The necessities of the war do not allow any extensive investigation, as it seems doubtful from the very beginning, especially if the expected results do not justify the effort involved.

The search for tuberculosis must neither give any reason for worries or unrest within the Field Army nor evoke unjustified criticism of the general conditions of health.

The program should be as extensive as possible and it should be accomplished with the most simple organization, with the use of only a few personnel and the use of limited material and equipment. This program should include the entire Army on the Eastern front.

The X-ray examinations in recruits should be carried out to a larger extent at the same time.

The safest and simplest way to get hold of all soldiers suffering from tuberculosis in the Field Army is to examine all soldiers by photofluoroscopy in the delousing departments of the larger stations, while they wait for their trains going to or coming from the front. While soldiers wait for their clothes, there is plenty of time to examine them in the meantime.

Most of the delousing stations have adequate room to carry out these examinations, otherwise it can easily be arranged.

Only photofluoroscopy is suitable. As the examinations frequently should be carried out day and night, two groups should alterately attend the equipment. The films are developed and evaluated in specially designated central places.

The disadvantage, that the result of these examinations cannot be known by the soldiers immediately must be accepted.

Only patients with almost certainly open lung tuberculosis will be registered or those who need urgent treatment based on other findings.

These patients are called to the attention of their authorized physicians of the Military District and have to report themselves to the nearest general hospital in the home territories.

In case of a general cancellation of leave, the examinations will be interrupted. Under these circumstances no other possibility for large scale X-ray examinations would be possible, neither within the Field Army nor in other parts of the Army.

All physicians belonging to the special branch "tuberculosis" have agreed to these proposals in the annexed discussion.

NICOL: Wished to emphasize that it is most important to get hold of all patients suffering from active open tuberculosis.

STEINMEYER: Approves the separation between sick and healthy soldiers as sufficient.

KAYSER-PETERSEN: He recommends the consideration of non-specific infiltration of the lung so that their carriers are not marked as tuberculosis patients. He also agrees with the proposal from the Civilian Public Health point of view.

KREUSER: He agrees with the proposal. He also estimates the expected cases as 1:1000. He recommends to not use the equipment established for prophylactic and preventive measure. for propagandistic purposes.

BALDEVIUS: He emphasized, based on his experiences made in the front lines, that examinations should not be carried out within the Field Army and agrees to the proposal.

GRASS: He agrees with the proposal, but he would rather have the findings of the films evaluated on the very day of the examination and without stopping the soldier's leave in case of discovering tuberculosis.

Before the above mentioned proposals were published, an experiment has been made at a main railway station in East Prussia. 30,000 soldiers have been examined before the general cancellation of leave. One photofluoroscopic unit was in use attended by one trained group and one group still in training. The films were developed in Koenigsberg and the findings were evaluated by a medical officer of the Army Headquarter. The transportation of films was guarded

by the train commanders of leave trains, who handed the
parcels to the military railway station commandant in
Berlin or Koenigsberg. Special difficulties occurred no-
where. There were also no disturbances in the delousing
stations. The result of the examinations amounts to
1,5:1000 cases.

5. The care of soldiers in the Field Army who suffer from tuberculosis.

Oberfeldarzt (Lt. Col., MC.) KREUSER

Soldiers who formerly suffered from tuberculosis and
have to undergo special treatments, must be specially cared
of so that this disease does not break out again because
of the strenuous duties and the different conditions of
life. The medical officer has to register these soldiers
and has to examine them at least every quarter of a year,
at which time X-ray examinations and blood sedimentation
rates should only exceptionally be made. Since Spring
1942 the number of new cases has been slowly increasing,
but so far has not reached the height of World War I. Out
of 370 patients suffering from tuberculosis who were evacu-
ated from an Army group to a military hospital, 240 had
open tuberculosis. In a mass X-ray examination about 68
out of 10 000 civilians of the same age group suffered
from tuberculosis, but the above figures represent only 4
soldiers out of 10 000. The emergency billeting for such
patients does not allow any special treatments in the Eastern
countries. Early diagnosis, the establishment of TB collect-
ing stations and speedy evacuation is the only possibility.
The early recognition of the disease is rather difficult,
since X-ray examinations are impossible. However, frequent
use should be made of the possibility of sputum examinations
in field hospitals. Progress in the stage of the disease
as well as a new infection of healthy soldiers up to the
time of evacuation is unavoidable. Most important is the
thorough instruction of all military physicians in the field
hospitals, the isolation of all suspected cases and the
speedy evacuation of all soldiers suffering from tuberculosis,
diagnosed by sputum examination. X-ray examinations are
usually possible in military hospitals, although the
quality of the films leaves much to be desired. The sedi-
mentation rate is usually determined, and thus the stage
of the disease may be diagnosed by these examinations in
the field hospitals. If open tuberculosis is diagnosed in
soldiers, the patients have to be evacuated and have to
undergo special treatments. Protective measures for the
environment are also necessary. The infectious patients
have to be isolated strictly and the sputum must be desin-
fected carefully. One must also pay attention to the pro-
tection of the nursing personnel, and young nurses, auxiliary
personnel, as well as persons who react negatively to tuber-
culin must be told of the hazard and must not be in contact
with these patients. Those exposed to danger of infection
must also be checked by X-ray examinations. The therapy

must be restricted to bedrest and symptomatic treatments,
while pneumothorax will only exceptionally be possible.
The evacuation of tuberculous patients to the homeland
means no new hazard to them as a rule, but the patients
must be transported in bed and patients suffering from open
tuberculosis must not be in contact with other patients
enroute. The medical attendants in charge of these patients
have to be informed of the disease and have to carry out the
necessary protective measures.

6. Tuberculosis occurring in foreign colonial troops.

Oberstabsarzt (Major, MC.) ROLOFF

German medical officers had the chance of observing
forms of tuberculosis on colored P.W.'s of the French
Colonial Army from America, Africa and Asia. Special examina-
tions carried out at the special colonial medical military
hospital at St. Medard near Bordeaux showed important results
The results of mustering medical examinations carried out
with photofluoroscopy made by French medical officers showed
16.8 per cent of active tuberculosis which exceeds the rate
among German soldiers 20 to 30 times. 10,000 photofluoroscopy
examinations carried out by the French have been checked with
the result that only 3 per cent of the examined showed active
tuberculosis. German examinations carried out on
10,000 colored soldiers showed almost the same result. Cases
of tuberculosis diagnosed on soldiers from North Africa,
Indochina and colored Americans harmonize in general with
the common European forms of tuberculosis from the subacute
to the chronic course, but only a few remnants of subsided
tuberculosis were found (calcification, cirrhosis). Bronch-
itis is a strikingly frequent form of the disease in colored
people. In contrast to the French evidence that only half
of the colored soldiers and the soldiers from Madagascar are
infected with tuberculosis, many acute cases of tuberculosis,
called negro tuberculosis, have been observed. These acute
cases are characterized by rapid caseation of pulmonary and
lymphatic foci accompanied by pleuritis, pericarditis and
peritonitis. The course of these forms is usually stormy
and combined with a general spread which curiously seldom
involves the bones and joints, urogenital system, skin or
organs of sense. The extreme changes of climate and the
strains of the war seem to accelerate the course of the dis-
ease considerably. The differences of the forms depend on
the stage of the infection, that is to say, on the degree
and the duration of the infection among these races. One
would almost be led to say that from the form of the tuber-
culosis one could diagnose the race of the patient and the
kind of infection. It is interesting to observe a character-
istic course of the tuberculin test in these colored people,
with the formation of small abscesses which will heal and
which appear similar to the basic KOCH test. No matter that
negro tuberculosis is in its basic principles similar to
children's tuberculosis, it is characterized by a poor prog-
nosis in case of other forms of general spreading.

Tuberculosis occupies first place among camp diseases with 1 - 3 per cent of the total number. The first infection of tuberculosis is specially frequent in negros. The separation of races is necessary to prevent any spreading of tuberculosis. The early recognition of patients is guaranteed by X-ray examinations of the camp inhabitants. The swelling of the glands has also to be observed. The isolation as well as the speedy evacuation of patients suffering from active tuberculosis has to be carried out as soon as possible It is necessary to instruct the nursing personnel and to check their condition of health by periodic examinations.

Directions:

There is no need for repeating the directions in this place as they have already been published in a special leaflet of the Army Manual. (Directi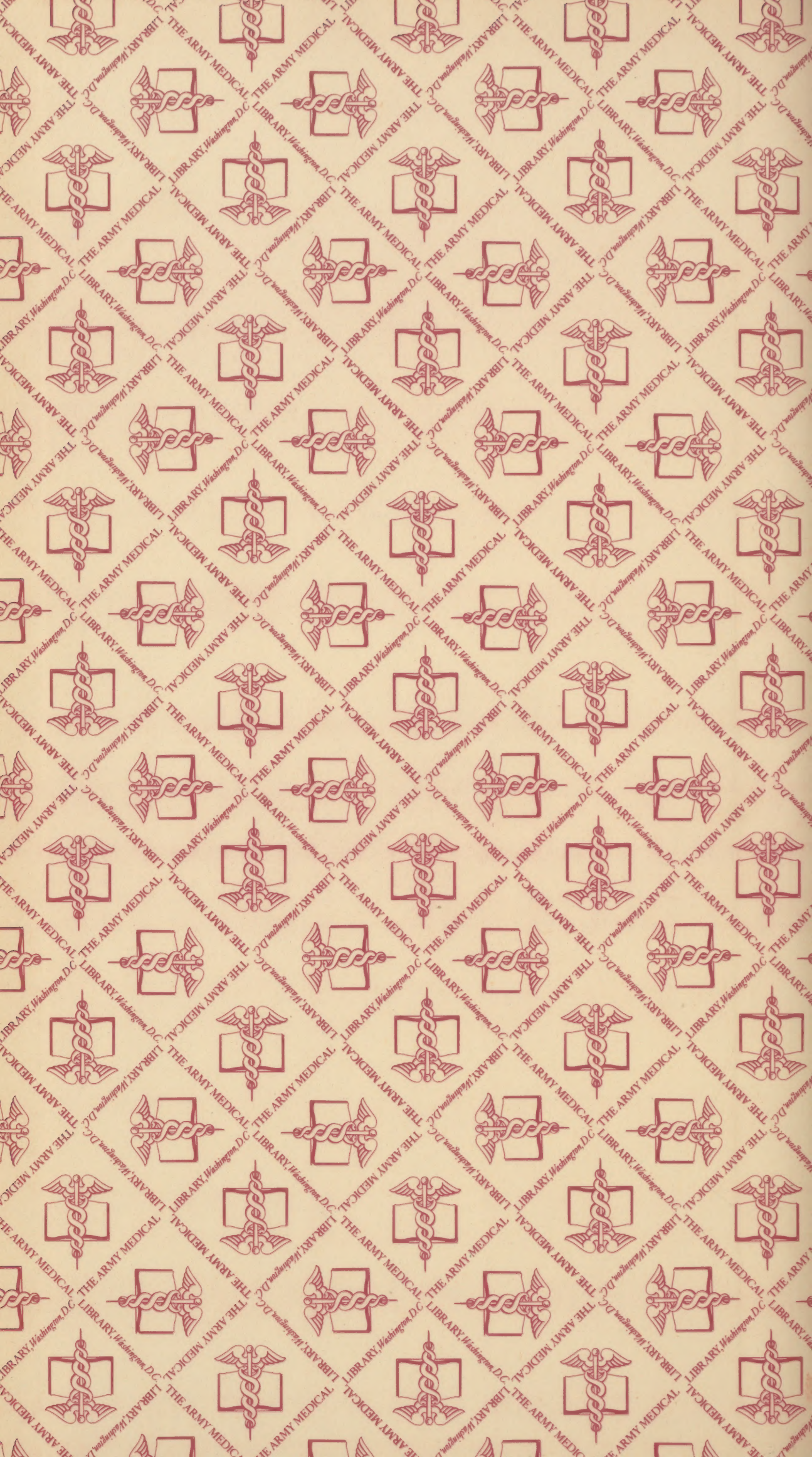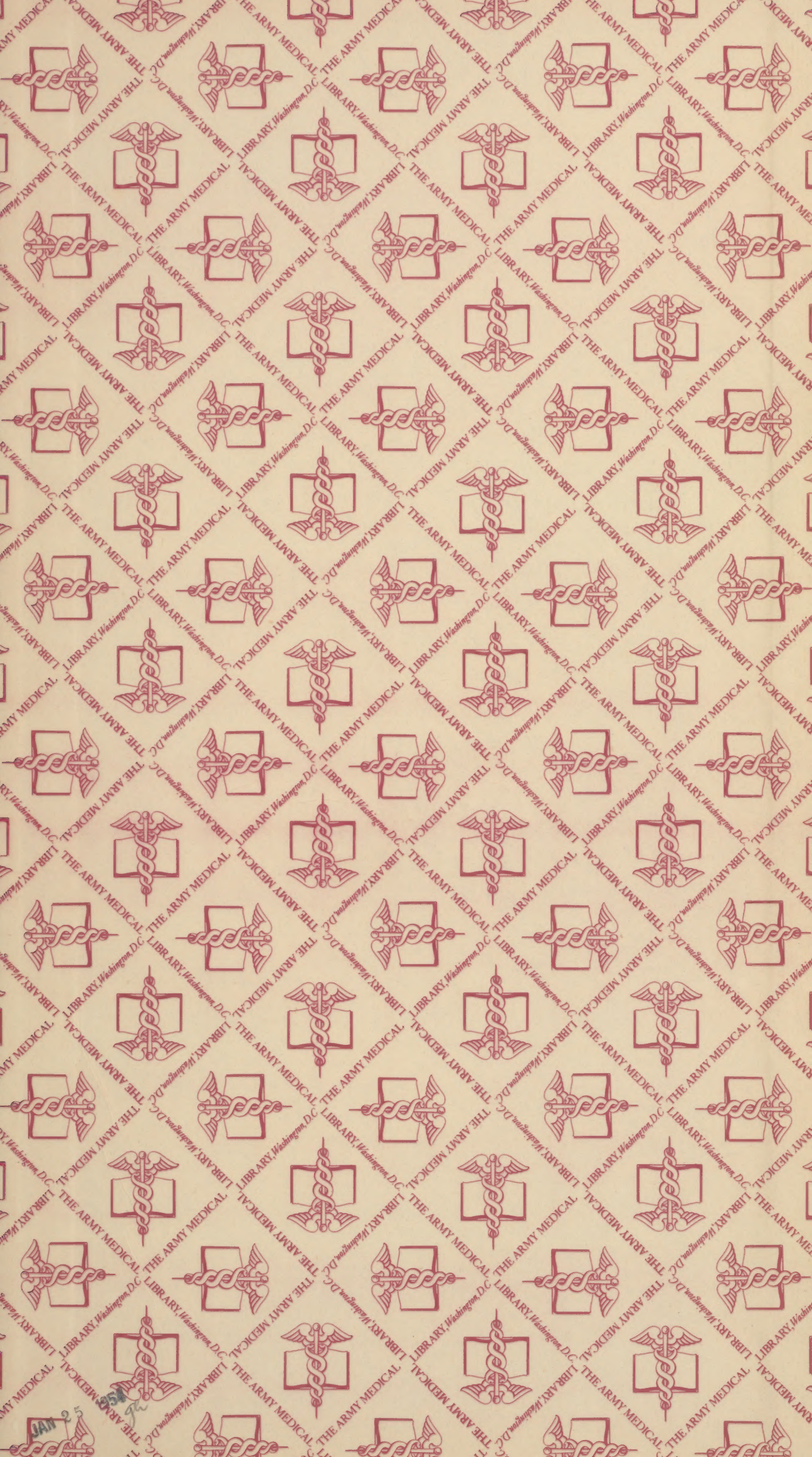ons not present in German text).